BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 30.] 1933. [No. 12.

MALARIA.

BARBER (M. A.) & FORBRICH (Louis R.). **Malaria in the Irrigated Regions of New Mexico.**—*Public Health Rep.* 1933. June 2. Vol. 48. No. 22. pp. 610–623. With 1 map.

This paper deals with the spreading of malaria in new areas, and recommends Gambusia as an antilarval agent. The introduction of these fish has already proved effective in some districts.

Malaria is now present in irrigated river valleys which lie within three widely separated areas of the State, at elevations of 4,000 to 5,600 feet. In two of these, it appears to be of recent origin and the author fears that it may spread to other districts, especially where land is being reclaimed from alkali by large drainage ditches. The local anopheles are *A. maculipennis*, *A. pseudopunctipennis*, and *A. punctipennis*. The carrier is *A. maculipennis* which shows the same propensity to haunt the house where it has fed which has been noted in Europe. Drainage has little value as an antilarval measure in an irrigated region ; indeed, the drainage ditches constructed to prevent water-logging are the chief producers of anopheles in southern New Mexico. Alfalfa and sweet clover are common, Chara is abundant, there are millions of bats in some places, but none of these have any apparent effect in checking mosquitoes. " Larvicides may be necessary to do away with a mosquito nuisance, or for local or temporary protection against malaria, but it is doubtful whether they can be profitably used year after year on a country-wide basis." The most promising measures are the wide dissemination of Gambusia, the treatment of carriers, education regarding treatment and screening, and prevention of the improper use of irrigation water. The malaria parasite rate has already fallen in some districts since Gambusia was introduced.

W. Fletcher.

WASHBURN (B. E.). **An Epidemic of Malaria at Falmouth, Jamaica, British West Indies.**—*Amer. Jl. Hyg.* 1933. May. Vol. 17. No. 3. pp. 656–665. With 3 maps.

This epidemic occurred after excessive rainfall following a drought during which clearing of forest and interference with drainage had occurred.

Falmouth is situated on the north coast of Jamaica and is surrounded by a brackish swamp on the landward side. The swamp is divided

into two parts by a road passing inland from the town, but they communicate by means of a culvert, and a flow of saline water coming through this from the eastern side maintains the salinity of the western swamp. There is very little malaria as a rule, and the only carrier is *A. albimanus* ; but, in 1931, there was an epidemic of malignant tertian which affected more than half the population of 8,000 and caused 138 deaths. The rainfall during the two years preceding this epidemic was abnormally low, so that the swamp behind the town became practically dry ; people were therefore able to go into it, and they made large clearings by cutting down the mangrove trees for fuel. They also, for some unknown reason, closed the communicating culvert between the two swamps. An abnormally heavy rainfall in 1931 followed the two years of drought, and the town was surrounded by large sheets of fresh water. The swamp on the western side, cut off by the blocking of the culvert, became filled with fresh water in which algae grew. This was followed by a great increase in anopheline breeding and an outbreak of malaria. It was controlled by Paris green dusting, and the filling of small pools in the town. "The most important control measure, however, was the reopening of the channel under the bridge—to permit sea water to enter again the large morass." *W. F.*

MANSON (D.) & RAMSAY (G. C.). **Further Observations on a Malaria Survey in the Jorhat District, Assam, with Some Notes on the Anti-Malaria Measures Employed.**—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 479–494. With 2 folding graphs.

A. umbrosus is widely distributed but does not feed on human blood. Heavy rains make Paris green less effective than oil. Planting for shade is dealt with.

The authors give a list of 18 anopheles which they have identified in Jorhat ; they have confirmed their previous conclusion (p. 64, above) that *A. minimus* is the important carrier of the district. *A. umbrosus*, which breeds in denser shade than any other species in Assam, was specially studied, because the shading of streams by planting undergrowth has been adopted as an antilarval measure. It has been incriminated as a carrier in the Malay States, but no specimens were found in human habitations or cow-sheds by the authors, and though it attacks man ferociously in the jungle during the daytime, none could be caught in buildings at night. Near a breeding-place of *A. umbrosus*, only *A. minimus* and *A. philippinensis* were found in human habitations ; *A. hyrcanus*, *A. barbirostris* and *A. philippinensis* were found in cattle-sheds.

The heavy rain in Assam makes Paris green less useful than in drier countries. If rain falls within 3 hours of its application it should be dusted again immediately. It does not destroy vegetation and can be used where efforts are being made to establish dense shade. Formerly, oiling was carried out with a mixture of crude oil and kerosine, but the coolies stole the kerosine, and now a mixed oil, called Malariol, is obtained from the Burmah Oil Company, at six annas a gallon ; one gallon is sufficient for 250 lineal yards of one edge of a stream. Particulars are given of the various shrubs and trees which are planted along ditches and water-courses in order to provide the dense shade which renders them unsuitable for the breeding of *A. minimus*. Duranta hedges take about 2 years to grow, before they give sufficient shade ; in the meantime, Paris green must be used. "Bamboo

matting can be anchored to the banks of tanks, and this effectually stops the breeding of *A. minimus*." It can also be used to cover narrow, tea section drains. The winter breeding places of *A. minimus*, on some highly malarious tea estates, are as far distant as 8 miles from their normal summer resorts around the coolie lines ; it is, therefore, futile to attempt to control the winter breeding. [See also WALLACE, p. 89, above.] *W. F.*

FARINAUD (M.). Recherches sur la valeur comparée et les corrélations des indices endémiques palustres au Tonkin. [**The Comparative Value of the Indices of Endemic Malaria in Tonking.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 819–828. [15 refs.]

Investigations of the splenic and the parasitic indices of children in Tonking gave similar results. The splenic index afforded more exact results in 1931, when there was much malaria ; the parasitic index was more exact in 1932 when there was less malaria. The author found that infection with *P. malariae* produced the largest spleens ; but, in the discussion which followed the paper, Professor MARCHOUX stated that therapeutic inoculations in non-malarious countries had shown that the biggest spleens occurred in *P. vivax* infections. *W. F.*

SCHWETZ (J.), BAUMANN (H.), PEEL & DROESHAUT. Etude comparative de la malaria chez les pygmées et les indigènes ordinaires de la forêt de l'Ituri (Congo Belge). [**A Comparative Study of Malaria among the Pygmies and the Ordinary Natives of the Ituri Forest.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 639–651. With 1 plate.

The pygmies are nomad hunters of the jungle, but the ordinary natives are agriculturists who live in permanent villages. As regards malarial infection, there is little difference between them, but the pygmies are very anaemic. This anaemia, which is characterized by anisocytosis and poikilocytosis, is associated with the presence of an enormous number of eosinophiles. The authors consider that the anaemia is probably due to helminthiasis ; the evidence is not given here. *W. F.*

VAN HELL (J. C.). De malaria te Weltevreden, Batavia en Tandjong Priok in het jaar 1931. [**Malaria in Weltevreden, Batavia and Tandjong Priok in 1931.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1933. Vol. 22. No. 1. pp. 1–13. With 1 fig.

The salt water fish ponds of Batavia are fertile breeding places of the malaria carrying mosquito *A. ludlowi*. Active measures were taken, not to drain them, but to free them from the algae which covered their surface. This was intended to render them harmless from a malarial point of view and was a comparatively inexpensive procedure. A kampong situated in the midst of clean fish ponds could show a spleen index of only 14 per cent. while in some kampongs of old Batavia the index might be as high as 80 per cent. The spleen index, taken in 1931 to determine the effect of these measures, which had been begun in the middle of 1928, showed especially in the more northerly situated kampongs of Batavia a definite diminution compared with those of 1917. Mortality rates, too, had fallen from 49 per mille in 1921 to 27 per mille in 1931, a figure which was but little higher than in Samarang and Soerabaja. *W. F. Harvey.*

WALCH (E. W.). Over de gezondmaking van Banjoewangi. [**Anti-malarial Measures in East Java.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1933. Vol. 22. No. 1. pp. 16–19. English summary (7 lines).

In Banjoewangi (East Java) the nuisance of marine fish-ponds breeding Anophelines was abolished by cutting through the dikes and giving the tidal water free access. At Tandjong Priok (W. Java) this method failed owing to the small tidal fluctuation, and for this and other reasons it is not recommended elsewhere in Java. [A successful method is to lay the ponds dry once a month (this *Bulletin*, Vol. 27, p. 640).] *A. G. B.*

MEZINCESCU (D.), PETER (F. M.) & CORNELSON (D. A.). Epidemiologische und therapeutische Malariastudien in Suliman. (1. Bericht der Malariaforschungsstation in Gurbanesti.) [**Studies of Malaria in Suliman (Rumania). Report I. of the Malaria Research Station at Gurbanesti.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. May. Vol. 37. No. 5. pp. 223–251. With 4 figs. [12 refs.]

This is the first report of an extensive epidemiological research and field investigation, which was started at the malaria station of Gurbanesti (Rumania) in 1930, with the object of studying the endemic malaria of the district and practical methods for its control.

The value of drug control forms the chief part of the investigation and the problem is being dealt with according to the following plan :—

In the following villages all parasite carriers are treated by standard schemes :—

1. In Gurbanesti by quinine. 2. In Ciofliceni by plasmoquine. 3. In Valea Presnei by quinoplasmoquine. 4. In Suliman by atebrin-plasmoquine. Other villages are being left without drug treatment, the parasite and spleen index being determined in them, and they act as controls. In the present report the investigations in the villages of Suliman are dealt with; the other investigations will form the subject of future reports. Suliman lies on the banks of a large expanse of sluggish water (100 km. long). The chief carrier of malaria is *A. maculipennis*. The blood examination of the inhabitants was carried out by thick and thin films. The blood from each was examined by two observers.

The following table shows the age distribution of the inhabitants of Suliman in comparison with the infection rate :—

Age groups	Number of inhabitants	Number of infected	Parasite index in age groups
			%
0—4 years	51	28	54·9
5—9 ,, ...	43	28	65·1
10—14 ,, ...	28	9	32·1
15—24 ,, ...	57	12	21·1
25 ,, ...	110	22	20·0
Total	289	99	34·2
0—24 years	179	77	43·0

It will be seen that the parasite rate from 0–24 years, 43 per cent., is nearly double that of the population group over 25 years, 20 per cent.

The distribution of malaria parasites according to age is :—

	Children under 12 years	12—24 years	25—80 years	Total
P. vivax	45	8	13	66
P. falciparum	9	6	8	23
P. malariae	Nil	Nil	Nil	Nil
Mixed infections (*P. vivax* and *falciparum*)	9	—	1	10
Total	63	14	22	99

The spleen index in August 1930 was 12·8 per cent., and in February 1931, 16·1 per cent. The drugs were well tolerated by the inhabitants, in a few cases yellow pigmentation of the skin was produced by the atebrin, and gastric pain was complained of by 8 patients taking plasmoquine.

The authors are not yet in a position to draw definite conclusions from the results of the researches. Before the commencement of the atebrin-plasmoquine treatment the parasite index of the population was 33·6 per cent., and 9 months after the completion it was 11·4 per cent. In 76 cases treated with atebrin-plasmoquine the relapse rate was 13·2 per cent. All cases treated with atebrin alone relapsed as the result of too small doses. The next publication will deal with the results in Suliman in 1932–32 and the results obtained in the other villages. *E. D. W. Greig.*

Moutoussis (C.). Recherches sur l'anophélisme et le paludisme en Grèce. [**Anophelism and Malaria in Greece.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 584–590.

The three principal carriers are *A. maculipennis*, *A. superpictus*, and *A. elutus*. The relative susceptibility to infection is shown by the following figures of sporozoite infection among the three species as caught in two refugee camps where the splenic index was 95 :—*A. maculipennis*, 0·9 per cent. ; *A. superpictus*, 2·7 per cent. ; *A. elutus*, 5·4 per cent. *A. maculipennis* is a mosquito of spring and early summer : *A. elutus* belongs to summer and early autumn : *A. superpictus* to late summer and autumn. *A. elutus* differs from *A. maculipennis*, in size, colour, wing markings and eggs. It breeds in the coastal districts and in the neighbourhood of the salt marshes. The Grecian race of *A. maculipennis* lays eggs with black bands and broad floats. These striated eggs resemble those of Falleroni's *variatio messeae*, which has been found by Martini, Missiroli and Hackett in those places where there is anophelism without malaria. In malarious districts, such as the Roman Campagna, they found Falleroni's *variatio labranchiae*, which lays grey eggs with narrow floats. The author states that in many malarious parts of Greece, *A. maculipennis* of the *messeae* type, is the only anopheline, and he thinks that the activity of *A. maculipennis* as a carrier of malaria depends more upon local conditions

than upon racial differences. Malignant tertian malaria, in the mountain villages of Greece, is carried by *A. superpictus*. [See VAN THIEL, below, p. 831.] *W. F.*

SWELLENGREBEL (N. H.). **Report on a Small Experimental Epidemic of Benign Tertian Malaria started in September 1931 and followed up till January 1933.**—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam.* 1933. Vol. 36. No. 2. pp. 234–239. With 2 graphs.

Neither atebrin nor plasmoquine plus quinine gave better results than quinine alone in this small epidemic.

This concerns the further history of 15 volunteers infected with benign tertian malaria during the test of plasmoquine as a prophylactic, made by the author and DE BUCK (see this *Bulletin*, Vol. 29, p. 357). The drug failed to prevent infection, and the 15 volunteers had 54 attacks—counting relapses. Twenty-three attacks, treated with quinine plus plasmoquine, were followed by 17 relapses ; 17 treated with quinine alone, by 12 relapses ; 13 treated with atebrin alone or with plasmoquine, by 9 relapses. The incubation period prior to the primary attack was very short, except in one case, because all the volunteers were bitten by as many as 5 to 12 mosquitoes ; this probably explains the failure of atebrin to prevent relapses. The primary attacks took place in the autumn, and the bulk of the relapses occurred in the following spring. A graph of these cases is almost identical with a graph representing the history of 30 patients of Dr. KORTEWEG who had their primary attacks at Wormeveer in the autumn, and the author concludes that " every spring case is a repetition of a usually latent, but occasionally patent, primary manifestation of malaria during the preceding autumn. The patent autumnal primary attacks of our experiment have occasioned a vernal epidemic which is the exact replica of a typical Dutch epidemic." *W. F.*

FERMI (Claudio). [La malaria e la decadenza delle civiltà.] [**Malaria and the Decadence of Civilization.**]—Decadenza, risanamento e risorgimento delle regioni malariche. Sardegna, Grottaferrata 1932. p. 116. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 356–357.]

Fermi has studied the history of Sardinia with reference to the part played by malaria in the decadence of the population and decides that its influence has been small.

He finds that the desertion of the lowlands for the hills had nothing to do with malaria but was the result of frequent raids on the coast. Sardinia like some other malaria-stricken places has a high birth-rate. The death-rate is not specially high compared with the provinces of Italy. For infant mortality malaria has less significance than irrational feeding and care of children. Such diseases as plague, influenza, syphilis weaken the population more than malaria. He attributes significant influence to alcohol, malnutrition, earthquakes and especially wars. In the decline of agriculture the first place is given to wars, faulty management, bad customs, floods and climatic changes. [This account is taken from the German summary.] *A. G. B.*

SOUTHERN MEDICAL JOURNAL. 1933. May. Vol. 26. No. 5. pp. 447–473.—**Symposium on Malaria.** [17 papers.]

Five of the papers read are here noticed, their subjects being—The health departments should deal with malaria as with other infectious diseases. Transport of *A. costalis* from Africa to Brazil. The two races of *A. maculipennis*. Convict labour for drainage. Suitable housing. The other 12 papers are noted by title on pp. 868–871.

The Chairman, Dr. E. L. BISHOPS, in his opening address, emphasized the point that the control of malaria does not differ in principle from that of other communicable diseases, such as tuberculosis and syphilis. It should not be set up as an independent service, but should be made a part of the general program of a local, whole-time, health department, with supplementary service from the central health organization in respect to malaria survey and scientific investigation. It should be remembered that control must be continued over a period of years and perhaps indefinitely.

Drs. H. E. MELENEY, Carrol FAUST, and G. E. RILEY presented a report on some recent advances in the epidemiology of malaria. They drew attention to SHANNON'S (this *Bulletin*, Vol. 27, p. 912; Vol. 29, p. 131) discovery of *A. costalis* in the town of Natal on the coast of northern Brazil, where it appeared to have been responsible for a severe outbreak of malaria. It was supposed to have been imported by one of the fast French mail steamers which make the trip from the West Coast of Africa in 4 days—"a striking example of the danger of rapid travel in modern times in creating new malaria problems." The work of W. C. EARLE in Porto Rico was mentioned: he incriminated *A. albimanus* as the important vector, and demonstrated the close relationship between the cultivation of sugar cane and the occurrence of malaria. The authors also attempted to correlate the work of HACKETT and MISSIROLI, BUCK, SCHOUTE, and SWELLENGREBEL, LA FACE and others, on Falleroni's two races—*labranchiae* and *messiae*—of *A. maculipennis*. *Labranchiae* occurs in malarious areas; prefers brackish water; frequents human habitations; does not go into complete hibernation; digests blood in winter; breeds in captivity; is a short-winged race; lays dappled-grey eggs, with small floats which have no network in the intercostal film; has a palmate structure on the second segment of its larva; has a conical claspette in the male adult. The *messiae* race predominates in the fresh inland waters of Italy, Germany and Holland, and in non-malarious zones: it frequents stables in preference to houses; goes into complete hibernation; does not digest blood in winter; does not breed well in captivity; is a long-winged race; lays an egg which is irregularly pigmented in bars and has large floats with a network in the intercostal film; has branched hairs on the second larval segment; has a quadrilateral claspette. (See VAN THIEL, below p. 831). The *labranchiae* race appears to have definite affinities with *A. elutus*, an important vector in Palestine. Studies directed by R. B. HILL in the central plateau of Spain showed that *A. maculipennis* had a flight range of more than 2½ miles.

Mr. Bruce MAYNE, Special Expert, U.S. Public Health Service, dealt with the application of mosquitoes in malaria therapy. The special advantages of employing mosquitoes, instead of injections of blood, are portability and the maintenance of the virus over long periods when infective blood is unobtainable. Mosquitoes can be stored unfed

for 2 months at 50°F. Anopheline eggs can be kept at temperatures of 38° to 42°F. for about 6 weeks, and then hatched out in three days at a temperature of 75°F. It would be convenient, if it were possible, to send living sporozoites by post, for injection by means of a syringe ; unfortunately all attempts to preserve sporozoites in the various citrate, salt and glycerine fluids which have been tested have proved unsuccessful, though they will live in mosquitoes for more than 2 days after the insects have died [but see Bruce MAYNE, below, p. 852].

Mr. L. M. CLARKSON, Chief Sanitary Engineer of the Georgia State Board of Health, emphasized the importance of drainage in malaria control. The great difficulty is lack of funds. Though money is scarce, labour is plentiful. Twenty-five counties in Georgia are employing convicts, and, in 1931, about 135 miles of ditches and canals were dug, and 10,000 acres were drained. " We adopt as our slogan ' A Ditch in time saves Quinine ' . . . Dynamite drainage may be mentioned. . . . One project involves about 7 or 8 miles of canal constructed by the use of parallel rows of dynamite. . . . Work of this nature is very spectacular and is very valuable in creating publicity and interest in malaria drainage. We usually have the newspapers take photographs of the dynamite explosions."

Mr. H. R. FULLERTON and Dr. E. L. BISHOP dealt with the housing of tenant farmers on large estates. The Tennessee Department of Public Health has issued a bulletin giving plans of suitable and cheap houses and also a plan of the suggested grouping of houses into small communities.

W. F.

WAGNER-JAUREGG. Inwieweit besteht eine Gefährdung der Umgebung durch die therapeutische Malaria? [**How far is Therapeutic Malaria a Danger to the Neighbourhood?**]—*Wien. Klin. Woch.* 1933. June 9. Vol. 46. No. 23. pp. 705–706.

The author deals with a communication by Dr. E. MARTINI on this subject [*ante*, p. 73].

He shows that from 1916 to 1920 large numbers of soldiers, heavily infected with malaria, returned to Vienna from the Italian, Russian and Balkan fronts. At the time medical circles in Vienna were perturbed by this as they thought malaria might become endemic in Vienna, but their fears proved groundless. Latterly there have been only 1 to 8 cases in the year, and these mainly amongst persons from foreign parts. Further, since 1919 in his clinic 3,000 persons have been treated with malaria and in other clinics another 3,000, and not a single medical officer, nurse, uninoculated or other person in the neighbourhood of these clinics has contracted malaria. He notes that 2 unintentional cases of malaria have been recorded from Sweden and 2 from Italy, the latter not being free from fallacy. He points out that MARTINI sees a special danger of spread of malaria in the relapse, but Wagner-Jauregg has never seen a relapse in Vienna in cases inoculated from infected persons and fully treated with quinine ; relapses appear to occur with high frequency in cases inoculated by allowing infected mosquitoes to bite them ; the latter system is not employed in Vienna and the author is unable to understand why MARTINI has a preference for it. The author concludes that MARTINI has exaggerated the danger to the neighbourhood from therapeutic malaria.

E. D. W. Greig.

WICHELS & MAASS. Die Uebertragbarkeit der Impfmalaria durch Anopheles. [**Transmission of Inoculation Malaria by Anopheles.**] —*Klin. Woch.* 1933. May 13. Vol. 12. No. 19. pp. 744–745.

A case of tertian malaria occurring in October in the wife of an employee at a psychiatric clinic at Greifswald in north Germany. Treatment by inoculation of malaria is practised in the building and it is believed that the infection was conveyed to the employee by anopheles, which are numerous at Greifswald This is the first case of the kind to be reported in Germany. [For a similar occurrence in Sweden see this *Bulletin*, Vol. 23, p. 828, KLING. Nothing is said of the strain of *P. vivax* employed, how long it has been in use, and whether gametocytes can be demonstrated or not.] *A. G. B.*

SERGENT (Edmond). Rapport sur le fonctionnement de l'Institut Pasteur d'Algérie en 1932. [**Report of the Algerian Pasteur Institute for 1932.**]—*Arch. Inst. Pasteur d'Algérie.* 1933. June. Vol. 11. No. 2. pp. 219–251. [68 refs.]

This report contains several interesting *ex-cathedra* opinions. Henry's reaction is of comparatively little value. Oiling is to be preferred to Paris green in Algeria. Gambusia is of great value in Algeria.

The splenic index is superior to Henry's reaction as a measure of the amount of malaria in the country. Henry's reaction is positive in trypanosomiasis and leishmaniasis, as well as in malaria ; in advanced malaria, the flocculation is produced by distilled water without the addition of Henry's antigens ; its results do not always accord with the microscopical findings ; in certain long-recovered cases of malaria, with neither parasites in their blood, nor enlarged spleens, the reaction is positive, though there is no reason to regard them as carriers of infection. [See also TZECHNOWITZER and others, below, p. 892.]

Paris green has the disadvantages of not killing the nymphs and of requiring more frequent application than oil ; sometimes the necessary sand, or other diluent, cannot be found near the place of application and on these grounds oiling is to be preferred in Algeria, unless there is a pronounced difference in the cost.

The Institut Pasteur introduced, in 1926, *Gambusia holbrooki*, the little larvivorous fish of Texas. It has become acclimatized, it has increased enormously and, where it flourishes, it destroys the larvae ; for example, in a reservoir recently constructed near Algiers it has kept mosquitoes in check throughout the hot season and rendered other anti-larval methods unnecessary. *W. F.*

THOMSON (J. Gordon). **Immunity in Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 483–503. With 2 charts & 14 coloured figs. on 1 plate. [64 refs.]

The lecturer's main thesis was that phagocytosis is an important factor in recovery from malaria, and that the clumping of cells seen in subtertian infections may be due to a sensitizing antibody.

The lecturer began with a comprehensive review of the work which has been done in this important field. DANIELS stated in 1901 that fever was common in native African children, but very rare in adults. The splenic index rose rapidly during early childhood, reached a maximum at the third year, remained high until the tenth year, and then declined rapidly. During this prolonged process of immunization in

African children, blackwater is practically unknown—a phenomenon which the lecturer suggested might be due to a racial immunity built up during generations of residence in hyperendemic areas. Europeans also acquire a partial immunity, associated as a rule with the persistence of a few parasites in the blood, but unaccompanied by much fever. " The longer these people reside in such areas, the more prone are they to develop blackwater fever. . . . Acquired immunity in Europeans, at least, is far from satisfactory and may be highly dangerous." Though adult natives in hyperendemic areas show few clinical symptoms and very little anaemia, Europeans who have developed a partial immunity are usually debilitated and anaemic, and constantly run the risk of blackwater. [See League of Nations report, below, p. 837].

CHRISTOPHERS (1924) found that, in a hyperendemic area in India, during the age period 0–2 years, the parasite rate was 100 per cent., the spleen rate was 88 per cent., and fever was continuous (" acute infestation "). During the age period 3–5 years, the parasite rate fell, there was less fever, and the spleen rate rose to 92 (" immune infestation "). From 6 to 10 years the parasites and fever became still less, and the spleen rate sank to 74. Adults were practically immune, there were few signs of malaria, fever was rare, the spleen rate was 11, and there were scanty parasites in the blood. The lecturer in summing up the evidence stated that the process of acquiring tolerance required continuous exposure to infection for about 15 years, and that the resulting immunity to superinfection in adults was associated with a latent infection. The length of time taken to attain this immunity might be due to the existence of many different strains of parasites in the locality, with each of which the individual must be " salted." [An immunity resulting from a persisting infection is known as *premunition*. Dr. C. M. WENYON explains in a footnote that, " the word ' premunition ' was introduced by Sergent, Parrot, and Donatien (1925) . . . to indicate an immunity or resistance to infection as a result of a still existing latent infection . . . a resistance to further inoculation of a host which is already tolerating the presence of a small number of parasites which are often demonstrable only by the inoculation of large quantities of blood into susceptible animals, as so frequently occurs in piroplasmosis."]

The lecturer then reviewed the work of JAMES (see this *Bulletin*, Vol. 28, p. 566) and others which has shown that an experimental acquired immunity to an inoculated strain of parasites can be developed in man, but that it does not protect against other strains of the same species. Some people, although they have never had malaria, cannot be infected experimentally, and it is clearly proved that certain individuals possess a natural or inherited immunity which is not always permanent. Attempts have been made to demonstrate the presence of immune bodies in the blood serum of malaria patients, but the difficulty of obtaining a pure antigen has rendered the results inconclusive.

The study of immunity in bird malaria has afforded valuable information. After the initial attack is over, a period of latency supervenes during which the blood contains sufficient parasites to produce infection if it is inoculated into healthy birds, but too few to be detected by microscopical examination. During this period, which may last two years or more, the bird is in a state of premunition, and is immune to further inoculations with the infecting strain, but when it has recovered completely and all parasites have disappeared, it is immune no longer.

The serum of birds in the latent stage has no protective action, and attempts to demonstrate antibodies have been unsuccessful; but CANNON and TALIAFERRO (this *Bulletin*, Vol. 28, p. 494) have shown that the immunity is primarily cellular and consists of a stimulation of phagocytic power of cells of the reticulo-endothelial system, particularly in the spleen and liver. The extent of this stimulation is such that if a bird in the latent stage be re-inoculated, all parasites are cleared out of the peripheral blood within 24 to 48 hours. TALIAFERRO (*ante*, p. 86) found a similar mechanism in Panamanian monkeys infected with the quartan parasite (*P. brazilianum*), where the acute infection is followed by a high degree of immunity during which the parasites continue to multiply, but are controlled by increased phagocytic activity.

With regard to immunity in human malaria, the lecturer showed pictures (an excellent coloured plate is reproduced) demonstrating the phagocytosis of undegenerated malaria parasites. In three human cases, the predominant feature was the activity of the polymorphonuclears; in another, the large mononuclears were digesting schizonts in large numbers. Films from the livers and spleens of other cases showed that the macrophages had engulfed the parasites. The reason why so few observers have seen parasites undergoing phagocytosis can probably be set down to faulty technique. It is very difficult to demonstrate, in sections, parasites within macrophages or Küpffer's cells, because they are obscured by masses of pigment; but in well-stained smears prepared from the liver and spleen the process is obvious. The tendency of blood cells infected with *P. falciparum* to clump together and adhere to the sides of blood vessels may be evidence of some antibody which sensitizes and stimulates phagocytic activity.

The discussion which followed Professor Thomson's lecture was opened by Major H. C. BROWN who spoke of his observations on the erythrocytes in bird malaria (see below, p. 830) and their bearing on the problem of immunity. Dr. G. M. FINDLAY, stated that he had confirmed the work of TALIAFERRO on bird malaria as to the intense phagocytic activity of the reticulo-endothelial system at the time when the parasites were disappearing from the blood. When parasites were inoculated into immune birds they disappeared within 48 hours, but if the R. E. system had been blocked beforehand, by an injection of trypan blue or Indian ink, they remained in the blood for 4 or 5 days. There was also some evidence of an immune body in the serum of immune birds. Col. S. P. JAMES said that Professor Thomson's specimens were characteristic of very acute cases; did they come from a person who was becoming immune, or from one on the point of death? Why should they be regarded as evidence that phagocytosis is the main factor in immunity? He also questioned if studies in bird malaria were a good guide to studies of immunity in human malaria. Professor W. YORKE did not think it right to regard phagocytosis as the essential process of tolerance in malaria. [*W. F.*

DE LANGEN (C. D.). **Polynuclear Leucocytes in the Phagocytosis of Malaria Parasites.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 523–524.

The formula is given of an intra-vital stain which enabled the author to detect the phagocytosis of malaria parasites by young polynuclear cells in two patients with severe malaria, one of whom died.

It is difficult to decide whether this is a usual process, or if it occurs only in exceptional cases when the blood is flooded with merozoites. "The pigment seen in our neutrophilic leucocytes gives more the impression of being phagocytosed and crumpled up merozoites . . . up to the present it must be considered as an exceptional phenomenon." The author's combined staining method, originally adopted by him for the study of reticulocytes, is as follows :—

"A drop of 1 per cent. brilliant cresyl blue, of which the pH has been adjusted to be as nearly neutral as possible, is placed on the finger-tip of the patient, which has been cleaned and rendered grease-free with ether. The prick is now made through the drop of stain, so that the resulting blood may mix at once with the staining solution. The exuding drop of blood is mixed thoroughly with the drop of stain by means of the stilette used to make the puncture. This preliminary staining lasts two minutes. Then the mixture of blood and stain is spread out on an ordinary glass slide in the usual way, dried, fixed with methyl-alcohol and counter-stained with Giemsa's stain. By this method excellent pictures are obtained."

W. F.

BROWN (H. C.). **Preliminary Observations on Electric Charge of the Erythrocytes in Bird Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 515–522.

Changes in the electrical charges of erythrocytes in bird malaria furnish evidence of the formation of immune bodies.

The author and Dr. J. C. BROOM have already studied the electrical conditions associated with the phagocytosis of bacteria. They have shown that typhoid bacilli normally carry a negative charge, and that in the presence of a specific immune serum this negative charge is reduced and the bacilli enter the phagocytes. They found that if the reduction in the negative charge of the bacilli were prevented by the addition of a polyvalent anion, such as potassium ferrocyanide, phagocytosis did not take place.

The author has now investigated the electric charge of the erythrocytes in bird malaria in the same way. A dilute suspension of the blood of the bird under investigation was placed in a cataphoresis cell, a pressure of 200 volts applied, and the time which the erythrocytes took to cross the field was observed. (Highly charged particles migrate more quickly than those with lower charges.) Daily observations upon the electric charge of the erythrocytes of infected birds, together with their parasite rates, were undertaken in 20 infected and 21 normal birds, and it was found that whenever there was a fall in the number of malaria parasites, the corpuscles migrated more slowly ; that is to say, their negative charge was reduced. The author and Dr. Broom have already shown that the charge of erythrocytes is reduced in the presence of immune serum, and it is suggested that the reduction of charge which occurs in bird malaria is also due to the presence of immune substances. All the birds were killed in order to estimate the degree of phagocytosis in the internal organs, and Dr. G. M. FINDLAY, in the discussion following Professor J. G. THOMSON'S paper (see above, p. 827) stated that when the parasites were very numerous and the electrical charge of the red cells was high, the spleen remained small, and the percentage of large mononuclear cells containing phagocytosed parasites was only 2 or 3 ; but with the fall in the number of parasites in the peripheral blood and the reduction in the charge of the red cells (that is to say, as the bird recovered from the attack), the spleen became soft and

enlarged, and the percentage of mononuclear cells with engulfed parasites rose to 14 or 15. This, Dr. FINDLAY suggested, was evidence of some immune substance. There appears to be no difference in the electric charge of cells containing parasites and the healthy cells in an infected bird. *W. F.*

MULLIGAN (H. W.) & SINTON (J. A.). **Studies in Immunity in Malaria. Part II. Superinfection with Various Strains of Monkey Malarial Parasites.**—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 529–568. [3 pages of refs.]

Infection with a strain of monkey malaria immunizes against the same strain.

The authors review work which has been done on super-infection and immunity in bird-malaria, human malaria and monkey malaria, and give references to about 80 publications. They then describe their own experiments with monkeys, from which they conclude that immunity to the parasites of simian malaria appears to be very similar to that found in the case of the human plasmodial infections. Several strains of *Plasmodium knowlesi*, with different immunological characters, were isolated from the Malayan monkey *Silenus irus*. An infection with one strain of *P. knowlesi* or with one strain of *P. inui* var. *cynomolgi* immunized against the same strain, but not against other strains of the same species. There was, however, some evidence to suggest that a slight degree of common immunity existed between strains of the same species of parasites, for an infection with one strain of *P. knowlesi* appeared to confer some tolerance to the effects of superinfection with a different strain of the same parasite ; there was an increased tendency to spontaneous recovery and a lessened tendency to relapse. This tolerance was possibly non-specific and due to a general stimulation of the reticulo-endothelial system by such malarial infections.

No cross-immunity between different species was demonstrated.

W. F.

VAN THIEL (P. H.). **Investigations on the Range and Differentiation of *Anopheles maculipennis* Races and their Bearing on the Existence or the Absence of Malaria in Italy.**—*Riv. di Malariologia.* 1933. Mar.–Apr. Vol. 12. No. 2. pp. 281–318. With 8 graphs, 1 fig. & 2 plates. [25 refs.]

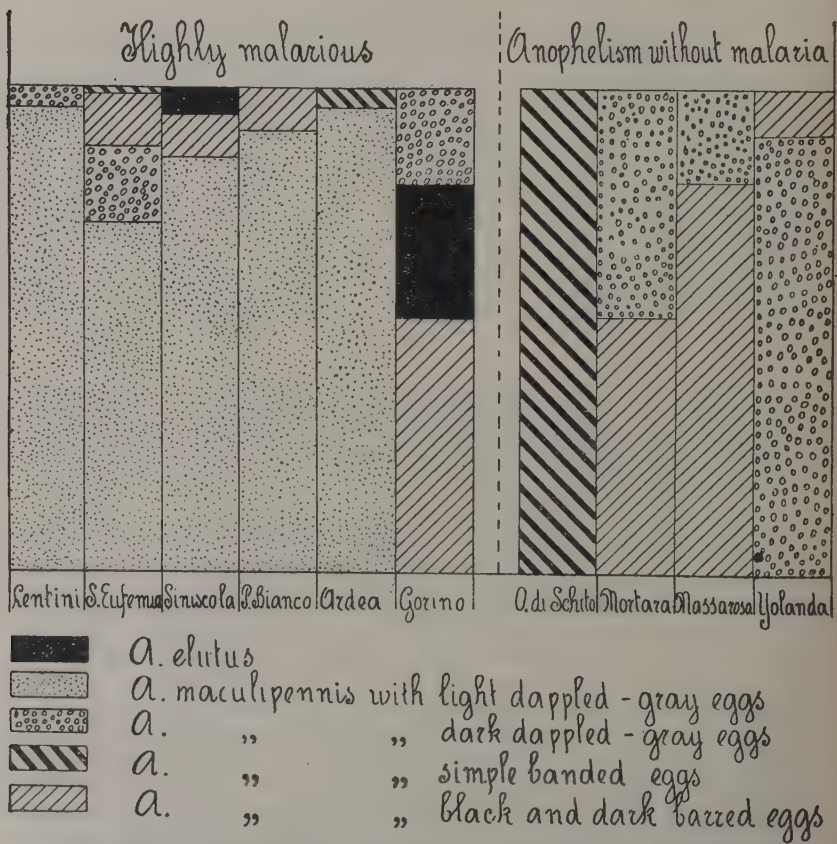
An attempt to correlate the races *A. maculipennis atroparvus* van Thiel and *A. maculipennis typicus* of the Netherlands, with Falleroni's races, *labranchiae* and *messiae*, in Italy.

The presence of anopheles without malaria in various European countries has been explained by the existence of several races within the species *A. maculipennis* Meigen. In the Netherlands, a small winged race with a large maxillary index—*A. maculipennis atroparvus* van Thiel—predominates in malarious zones, and a larger winged race with a smaller maxillary index predominates in non-malarious zones. Similarly, in Italy, a race known as *A. maculipennis labranchiae* Falleroni which breeds almost exclusively in low-lying, brackish marshes, is androphilous, frequents dwellings and predominates in malarious areas. Another race predominates in zones where there is no malaria ; this is *A. maculipennis messiae* Falleroni, a misanthropic race which breeds in fresh water and frequents stables rather than dwellings. The two races are distinguished by their eggs ; the eggs of

labranchiae are dappled, the eggs of *messiae* are barred. The author visited Italy at the invitation of the International Health Board of the Rockefeller Foundation, and studied the question of the identity of the two Dutch races with the two Italian races. He decided that his *A. maculipennis atroparvus* was not identical with *A. maculipennis labranchiae* Falleroni, and that *A. maculatus typicus* Meigen was not identical with *A. maculatus messiae* Falleroni. The paper contains a large number of measurements and is difficult to summarize.

The Bologna school (Ottolenghi, Bonalberti, Brighenti) assert that the connexion between wing-length and malaria which has been established in Holland, does not obtain in Italy; for example, in malarious Gorino, the anopheles have not shorter, but longer, wings than the anophelines in non-malarious Yolanda. The author investigated this problem and decided that the malaria in Gorino was not due to the long-winged *A. maculipennis* but to the concurrence of *A. elutus*.

He slept for a night in an unscreened room over a stable at Orti di Schito, near Pompeii, where there is anophelism without malaria.



Graph illustrating the correlation between malaria and *A. maculipennis* with light dappled-gray eggs. Where only dark dappled-gray eggs, simple banded eggs, or black and dark barred eggs are found malaria is absent. The malaria at Gorino is explained by the presence of *A. elutus*.

[Reproduced from the *Rivista di Malariologia*.]

Hundreds of anopheles filled with blood were found in the stable, but in the bedroom there were only two anopheles—unfed—and a few culicines. Here the anopheles belong to the zoophilic *messiae* race which lays banded eggs, and there are many cattle. " If the cattle should disappear," says the author, " the chance for malaria to break out comes back." However, he does not believe, with ROUBAUD, that predominance of one kind of host causes prominence of one race of anopheles ; there must be a change in the condition of the breeding places as well, *e.g.*, an alteration in the salinity of the water.

He has " been able to confirm completely the observation of the Italian authors that there exists a strong correlation between the presence of malaria and the presence of mosquitoes with light dappled-grey eggs."

He is convinced that the differences between *maculipennis* populations in different parts of the Netherlands are genetic differences, and are not modifications caused by different circumstances in the breeding places. The same is probably true in Italy, but it has not yet been established.

[It is interesting to note, as a contrast, that in parts of Italy malaria appears to have been suppressed by keeping salt-water out of the breeding places, while in other countries, such as Jamaica (see WASHBURN, above) it has been suppressed by letting it in. DE BUCK, TORREN and SWELLENGREBEL state that the pattern of the dorsal surface of the eggs of their short-winged, malaria-carrying, race resembles the pattern on the eggs of the Italian variety *labranchiae*, and the pattern on the long-wing's eggs resembles that of *messiae*. See this *Bulletin*, ROUBAUD, Vol. 19, p. 476 ; Vol. 29, pp. 140 & 831. DE BUCK, SCHOUTE & SWELLENGREBEL, Vol. 27, p. 910 ; Vol. 29, p. 345 ; Vol. 30, p. 70. HACKETT, MARTINI & MISSIROLI, Vol. 28, p. 569 ; Vol. 29, pp. 480 & 832 ; below ; TRENSZ, Vol. 29, p. 141. VAN THIEL, Vol. 29, p. 142.] *W. F.*

MISSIROLI (A.), HACKETT (L. W.) & MARTINI (E.). Le razze di *Anopheles maculipennis* e la loro importanza nella distribuzione della malaria in alcune regioni d'Europa. (**Study of the Races of** " *A. maculipennis.*")—*Riv. di Malariologia*. 1933. Jan.–Feb. Vol. 12. No. 1. pp. 1–56. With 1 plate, 12 figs. & 6 graphs. [14 refs.] English summary p. 258.

There are at least four varieties of *A. maculipennis*. " Three of these four are genotypes and differ almost as much from one another as they do from *A. elutus*, which may, therefore, be considered as only a well-marked race of *A. maculipennis*." These races have been localized in Italy and Germany. Each race has been linked with the hydrological conditions of its larval habitat and with the incidence of malaria. All the races of *A. maculipennis* are associated more frequently with animals than with man, but individuals of *A. maculipennis elutus* and *A. maculipennis labranchiae* are found in close association with man, and intense endemic malaria is found where they are abundant. Other varieties, especially *A. maculipennis maculipennis* and *A. maculipennis messeae* are attracted almost exclusively to stables and are not good carriers in the natural transmission of malaria. When they are present in excessive numbers, and stabled animals are scarce, they are able to maintain endemic or epidemic malaria. Where such conditions

exist (Mantua, Medemblick, Emden) benign tertian fever of low intensity may occur, and the importation of a large number of gametocyte carriers may provoke a temporary recrudescence. [See VAN THIEL, above, p. 831.] *W. F.*

KLIGLER (I. J.) & MER (G.). **Studies on Malaria in an Uncontrolled Hyperendemic Area. X.—Behaviour of *A. elutus* in Relation to Housing and Malaria.**—*Riv. di Malariologia.* 1932. Sept.–Oct. Vol. 11. No. 5. pp. 553–583. With 6 charts & 2 figs.

The authors find no evidence of " homing instinct " or of zoophilic races in *A. elutus*.

This paper describes the authors' further researches at Melaha and Yessod near the Huleh marshes. Melaha is a Beduin camp, and Yessod is a settled Jewish village. The principal aims of the investigation were to determine whether *A. elutus* was a house-haunter and night-biter ; whether certain types of houses were more attractive than others to *A. elutus* ; whether these mosquitoes returned to the houses where they had fed (" Homing and Hospice return instinct ") ; and if some strains of *A. elutus* fed on animals and others fed on man. They concluded that :—

(1) *A. elutus* is a house-haunter, but feeds on people and animals sleeping out of doors. (2) Absence of light, ventilation and smoke offer attractive conditions for the concentration of *A. elutus* in houses. (3) The mosquito seldom returns to the house where it has fed. There is an active interchange ; only specimens having no need of oviposition remain in houses. A hut made of matting was erected : it was dismantled after 8 days and the mosquitoes counted. When it was left up for two or three weeks the number was no greater. When it was left up for only one day the number was only 50 per cent. less, and one of the mosquitoes was infected. These results testify to a rapid interchange. (4) With reference to the existence of zoophilous and androphilous races of *A. elutus*. The mosquitoes emerging in the spring and autumn are larger than those in the summer, but animal preference was not demonstrated and the authors ascribe the larger size to a slower rate of emergence in the colder seasons of the year. It is possible that smaller mosquitoes feed more easily on thin skinned man than on thick skinned animals. " It is conceivable that greater ease in obtaining food from one rather than another animal may ultimately lead to the selection of a strain having a certain preference ; in that case, it seems to us that a combination of factors, such as temperature of the breeding places, the number of cattle and conditions of stabling, and finally dwellings and customs of the inhabitants unsuitable for the insects all operating in the same direction, will be required to effect the desired change." [See this *Bulletin*, above, p. 468.] *W. F.*

HODGKIN (E. P.) & RAJAMONEY (P. D.). **I. *Anopheles hyrcanus* Pallas as a Malaria Carrier in Malaya** [HODGKIN]. **II. A Descriptive and Biological Note on the Malayan Varieties of *Anopheles hyrcanus* Pallas** [HODGKIN & RAJAMONEY].—*Bull. Inst. Med. Res. Federated Malay States.* 1932. No. 1. 18 pp. With 2 plates & 1 folding map. [31 refs.]

i. Eighty-three cases of malaria were reported in Kuala Lumpur during 1930, among the population of 133,000. Forty-seven of these

cases occurred in low-lying land near a river, where there were several large, weed-grown ponds, in which the most numerous anopheline breeder was *A. hyrcanus*. The dissection of 300 adults of this species, taken by means of a human bait mosquito-trap, showed an infection rate of 6 per cent.—4 per cent. in the gut and 2 per cent. in the glands. Five of the midgut infections were due to *P. vivax*, and six to *P. falciparum*. Both varieties of *A. hyrcanus*, *viz.*, *sinensis* and *nigerrimus*, acted as carriers.

ii. There are some six or eight varieties of *A. hyrcanus*, two of which namely *sinensis* and *nigerrimus*, are found in the Malay States. Clear diagrams are given which illustrate the distinctive markings. *A. hyrcanus* is an open swamp breeder and readily attacks man. *W. F.*

Strickland (C.) & Chowdhury (K. L.). **The Sporozoite Rate of Anophelines caught Wild in the Terai, 1931. With a Note on Some Correlations in the Infectivity of** *A. funestus*, **by** H. P. Chaudhuri. —*Indian Jl. Med. Res.* 1933. July. Vol. 21. No. 1. pp. 67–89. With 1 chart & 1 map.

Of *A. funestus* (*minimus* and *listoni*) caught in tea-garden coolie-lines, 4·7 per cent. were infected.

The Sergents' method for determining the malarial infectivity of mosquitoes is much quicker than the old method of dissecting out the salivary glands and gut. This newer method was employed in the examination of 22,000 female anophelines taken in the Darjeeling Terai. The following were the prevalent species:—*A. funestus*, 7,912; *A. vagus* 10,452; *A. subpictus* 704; *A. fuliginosus* 1,417; *A. culicifacies* 1,138. *A. philippinensis* 29. The following were found infected: *A. funestus* 308; *A. vagus* 2; *A. philippinensis* 1. The proportion found infected in different shelters was as follows:—Tea-garden coolie-houses, 4·7 per cent.; village coolie-houses, 3·0 per cent.; village cattle-sheds, 2·5 per cent. The enumeration of anopheles in houses and cattle-sheds demonstrated the relative zoophilism of *A. fuliginosus* and the corresponding androphilism of *A. funestus* and *A. vagus*. The infectivity rate was higher in the evening than in the morning, and the authors suggest that this was due to the return of the older mosquitoes to shelter, after oviposition during the day. There were more anopheles in the coolie-lines than in the houses of the superior staff, yet blackwater fever was more common in the latter. The authors ascribe this difference to the presence of smoke in the coolie-lines, which they suggest may kill off the anopheles before they become infective. *W. F.*

Fairley (N. Hamilton). **A Case of Malaria due to** *Plasmodium ovale* **Stephens 1922.**—*Brit. Med. Jl.* 1933. July 15. pp. 101–102.

Stephens reported in 1922 a new malaria parasite in a man coming from East Africa and, because of its shape, he called it *Plasmodium ovale*. The parasite resembled *P. malariae*, but the infected corpuscles were oval in shape and were stippled with Schüffner's dots. In 1927, Stephens and Owen described a case from Nigeria; in 1930, Yorke and Owen described another from the same place, and here the author reports a case in a man of 28 who contracted the infection during a tour of 143 days in various parts of West Africa. The species

of parasite was suspected on clinical grounds when the laboratory reported the finding of atypical quartan parasites in a patient with a tertian fever. Further examination proved the suspicion correct, for the parasites showed the morphology of *P. ovale*; the red cells were pale, fragile and characteristically oval, and they were heavily stippled with Schüffner's dots. This stippling was not present in films stained with Leishman, but was demonstrated by staining overnight with Giemsa. The urine showed excess of bile salts and urobilin, with a trace of bile pigment, and a positive indirect van den Bergh reaction of 2·5 units. After five days treatment this fell to the normal level of 0·2 units and, with recovery, the reticulocytes increased. They reached a maximum of 6·3 per cent. on the eighth day of treatment, and declined to the normal level of 1 per cent. a few days later. [See this *Bulletin*, Vol. 20, p. 296; Vol. 28, p. 606; Vol. 30, p. 74.]

W. F.

INDIA. **Annual Report of the Public Health Commissioner with the Government of India for 1931.** Vol. II. pp. iv+187. 1933. Delhi. [Rs. 1-10 or 2s. 9d.] [**Malaria** pp. 22–25.]

"An attempt was made to prove or disprove the existence of missed malaria, *i.e.*, cases in which the parasite could not be found and which were diagnosed under some other heading. With this object in view, the hospital record cards of five British infantry units were examined and the cards of all cases who were admitted for any febrile condition which was followed later in the year by an attack of malaria were scrutinized. The units selected were stationed in Peshawar, Sialkot, Ferozepore, Amritsar, Lucknow, Mhow and their associated hill stations. The total strength is not known accurately but must have been over 4,000, out of which number 1,951 individuals provided 2,688 admissions to hospital. Thus approximately half the men were not admitted to hospital during the year. Among the total of 2,688 admissions there were 38 admissions for febrile conditions followed later in the year by an attack of malaria. From the description and after history of the cases they could be divided into 'possible' and 'probable' missed malaria. The results with the diagnosis in the primary admission were as follows:—

Primary diagnosis	Possible malaria	Probable malaria
Sandfly fever	32	20
Constipation	3	1
Myalgia	2	2
Heat exhaustion	1	1
Total	38 (1·4 per cent.)	24 (0·9 per cent.)

If these figures can be accepted as a guide the amount of missed malaria cannot exceed 1 per cent. of the total admissions which must be considered satisfactory."

W. F.

VAN DER HORST (G. A.) & VERHAART (W. J. C.). De veranderingen in de hersenen bij malaria. [**Cerebral Changes in Malaria.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. June 20. Vol. 73. No. 13. pp. 797–812. With 6 figs. on 2 plates. [50 refs.]

Clinical and pathological conditions described in the literature and referable to the nervous system as a result of malarial infection are very diverse and numerous. The malarial " granulomata " of DÜRCK are composed of small glial cell aggregations with a perivascular arrangement. Out of 21 cases examined by the authors 8 showed focal lesions of granulomatous character. They consisted of perivascular necrosis surrounded by a greater or smaller number of microglia cells around which a haemorrhage or a zone of tissue rarefaction was evident. This is construed as a manifestation of a phagocytic process. All points considered, it is difficult to establish a histological diagnosis of cerebral malaria. It is certain that the finding of some perivascular areas, punctate haemorrhages and diffuse microglial proliferation does not explain the cause of death. Still more generally it may be said that a pure malarial encephalopathy is of rare occurrence. Only once out of the 21 cases examined could it be established and in the remaining cases the disease picture was complicated with cachexia, severe anaemia, jaundice or other symptom so that the cerebral condition was not the prominent affection but rather an agonal state. The authors could not diagnose anything resembling the so-called coma of malaria and consider that a general toxaemia plays the chief part in the production of that condition. *W. F. Harvey.*

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION OF THE LEAGUE OF NATIONS. Geneva. 1933. June. Vol. 2. No. 2. pp. 181–285. With 8 figs. & 5 graphs. [6 pages of refs.]—**The Therapeutics of Malaria. Principles of Treatment based on the Results of Controlled Experiments. Third General Report of the Malaria Commission.**

The later one begins treatment, except in very severe cases, the better will be the results. Quinine in curative doses should not be given for longer than 7 days. Plasmoquine should not be used in the treatment of the primary attack, or given in combination with other drugs.

The Commission entrusted the task of preparing a report on the therapeutics of malaria to a committee consisting of Colonel JAMES, Professors C. D. DE LANGEN, P. MÜHLENS, B. NOCHT, G. PITTALUGA, and Ed. SERGENT. A draft report prepared by Colonel JAMES, was adopted after discussion and amendment. It deals with the subject " from the point of view of persons who are in a position to obtain expert medical advice and efficient care rather than from that of the mass of the population of malarious countries. The report does not contain information on plans for treating outpatients who attend at hospitals and dispensaries."

It was decided at the outset that no standard form of treatment could be recommended, for it has been proved that, although such a scheme may suffice for curing most cases of malaria in the country where the routine was devised, it may be quite ineffective in another part of the world. It seems probable that the therapeutics of malaria, like every other aspect of the disease, is much more a local and individual problem than has hitherto been thought. The Commission

is of opinion that, at the present time, it is more important to devise a standard method for testing the therapeutic efficiency of drugs in different countries than to set up a standard treatment. All clinical tests of the power of drugs to prevent relapses which were made prior to 1931 were misleading because of lack of knowledge of the important type of recurrence in benign tertian which occurs about eight months after the primary attack. For example, the conclusion that plasmoquine was a true causal prophylactic was upset by the occurrence of malaria among some of the volunteers seven or eight months later. Again, it was believed, until recently, that relapse was almost inevitable in benign tertian, but now it is known that only about 50 per cent. of infections with *P. vivax* relapse after quinine treatment, and that, in several countries, some of the benign tertian cases are caused by *P. ovale*, an infection from which complete recovery occurs so quickly that specific treatment is hardly necessary.

As regards the problem of true causal prophylaxis, the final aim of chemotherapeutic research is to find a drug which will destroy the parasites injected by the mosquito before they have entered the red cells. No one has repeated SCHAUDINN'S observations, in which he described the entry of the sporozoites into red blood cells. Sporozoites are essentially tissue cells. Perhaps some of them do not pass at once into the blood stream, but enter subcutaneous connective tissue cells and remain quiescent there until these cells break down some months later ; or perhaps not all of those which enter the blood stream proceed at once to attach themselves to blood corpuscles, but some enter the reticulo-endothelial cells and there undergo development (like the avian haemoproteus) producing merozoites which escape from the cell and enter the blood cells. On these hypotheses, it has been suggested that a true causal prophylactic may be concerned, not only with the destruction of sporozoites in the blood stream but also within tissue cells. Repeated trials with quinine have shown that it has no causal prophylactic action ; that is to say, it does not destroy the organism injected by mosquitoes before it continues its life cycle in the human host. As regards plasmoquine, more than fifty experimental trials have been made in England alone, and, as a result, it appears that the doses which it is necessary to use for the purpose are too large for safety. If 0·08 grams a day are given, beginning on the day before experimental infection and continuing for 5 days thereafter—reducing if necessary to 0·06 gm. from the fourth day—plasmoquine acts as a true prophylactic. In doses of 0·06 gm. over the same period, or of 0·04 given for three days longer, it will prevent the onset of an attack within the usual incubation period, but it will not always prevent a latent infection which may become manifest in 7 or 8 months. This is true for persons who are infected on only one day. When volunteers were exposed to the bites of mosquitoes two or three times a week over a period of 4 or 5 weeks, as they might be in a malarious country, 50 per cent. of them developed malaria though they took 0·04 gm. of plasmoquine throughout the period of exposure. It appears that it would be effective only if it were taken continuously in doses of at least 0·06 daily, and this dose is too large to be taken for more than a few days with safety. Preference should be given to atebrin ; 0·3 grams of atebrin daily has the same effect as 0·06 of plasmoquine, and is quite safe. Seven persons who were given atebrin in these doses, on the day before infection and for 5 to 8 days afterwards, were protected from ordinary attacks, but some of them had latent infections which

became manifest 7 or 8 months later. The preparation Fourneau 710 appeared to act in the same way as plasmoquine, but to be even more toxic.

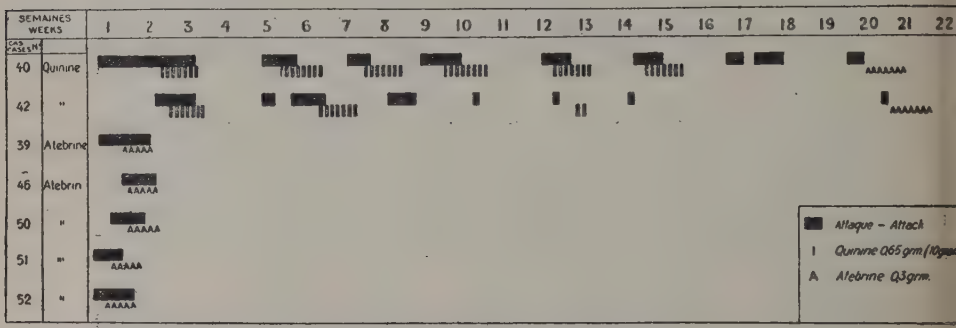
Clinical prophylaxis differs from causal prophylaxis, because, in the former, no attempt is made to prevent infection ; its object is to prevent the parasites from causing fever and illness. The Commission recommends for this purpose a daily dose of 0·4 gm. (six grains) of quinine throughout the malaria season and for several months afterwards. Children from 4 to 12 are given half the adult dose, and babies receive 5 centigrams for each year of age, in chocolate-coated pills. Quinine does not begin to act until fever is on the point of occurring, that is, not until parasites can be found in the blood, and, if the dose is omitted, an attack is likely to occur. The wide experience of the Italian school shows that clinical prophylaxis is a valuable measure in endemic areas, particularly in those where medical attention is difficult to obtain.

Atebrin, in daily doses of 0·1 gm., appears even more effective than quinine as a clinical prophylactic but, as with quinine, the suppressed fever may flare up when it is stopped. A patient at Horton who continued the doses for 15 days after infection had an attack 3 months later. It would be premature to recommend atebrin for clinical prophylaxis until it is known to be harmless when continued over long periods.

As regards the treatment of the attack ; "we wish to . . . . correct the common view that the earlier one begins specific treatment the more successful will be the results. Except in very severe cases . . . the truth is just the reverse. To give large doses of quinine indiscriminately to all cases of malaria is a grave error." Persons who pass through a few attacks acquire a certain degree of immunity, and an endeavour should be made to prescribe the doses of quinine which are just sufficient to be effective at the particular stage of the disease without interfering with the patient's defensive mechanism (but, see Gordon Thomson, above, p. 827). Relapses are always much more easily controlled than are primary attacks, because the patient already possesses some acquired defensive power. The risk of pernicious symptoms in malignant tertian is greatest in the primary attack and early recrudescences ; in relapses, the patient is protected by the immunity he has acquired. [The advantage of delayed treatment will be disputed in those tropical countries where infection with malignant tertian parasites is not a single event, but an almost daily occurrence.] In all cases with severe vomiting or cerebral symptoms, a dose of the specific remedy should be given intravenously. Quinine bihydrochloride 0·6 gm. (9 grains) or 0·3 gm. of atebrin, dissolved in 5 cc. of normal saline, are suitable doses. The Commission strongly disapproves the practice of treating ordinary cases of malaria by intravenous or intramuscular injections of quinine.

The treatment of the attack and the attempt to prevent relapses should be kept separate ; "courses of treatment with curative doses should not exceed seven days", long treatments impede immunity. The attack can be controlled by seven days' treatment, and the quinine should then be stopped, until a recrudescence occurs and parasites can be found, when another seven days' treatment should be given. In benign tertian malaria, if there is a second recrudescence three or four paroxysms should be allowed to occur unchecked before resuming

treatment in order that immunity may be acquired. Later recrudescences may be controlled by smaller doses. An alternative plan, which may be employed after the primary attack has been controlled is the adoption of clinical prophylaxis—*i.e.*, a daily dose of 0·3 to 0·4 gm. of quinine daily, throughout the period of residence in a malarious district. As regards quinine, large doses are not more effective than moderate doses; "there is a general consensus of opinion that, to obtain the optimum action of specific antimalarial remedies, the co-operation of the host's defensive mechanism is necessary, and that this mechanism may be greatly impaired by giving the specific drugs in too large doses, or during too long a period."



Graph showing the superiority of atebrin over quinine for the cure of primary attacks of malignant tertian malaria. All cases were experimentally infected with the Rome II strain by the bites of the same infected mosquitoes on about the same dates.

[Reproduced from the *Quarterly Bulletin of the Health Organisation, League of Nations.*]

The treatment recommended for subtertian malaria is not the same as that recommended for benign tertian; in benign tertian, quinine is as useful as atebrin, but in subtertian, atebrin is definitely superior, as is shown by the diagram (reproduced) of the results of treatment with atebrin and quinine respectively. The first recrudescence in subtertian occurs within 15 days of the primary attack, and each recrudescence is milder than the one before. Each recrudescence should be treated in the same way as the primary attack, by a 5 to 7 days' course of atebrin or quinine. It is a good practice to alternate the drugs, *i.e.*, atebrin for the primary attack, quinine for the first recrudescence, atebrin for the second, and so on. Early reports to the effect that atebrin was completely effective in preventing relapses have not been confirmed by later work, but it has a more powerful action in this respect, as regards subtertian, than any other drug. It is less effective in benign tertian and does not prevent the recurrence which occurs half a year after the primary attack.

Plasmoquine, in safe doses, is not considered to have an effective action on the asexual stage—particularly of *P. falciparum*—and it should not be employed in the treatment of the primary attack; indeed, its toxic effects seem to be enhanced by fever and anaemia. There does not appear to be any advantage in giving plasmoquine with quinine or atebrin. The drugs do not form a new combination in the stomach, each exerts only its own action, and the toxicity of plasmoquine is not reduced. "Many reports are available which seem to

show that better results are obtained when quinine is mixed with another drug (even if the drug is not itself a specific remedy) . . . but at the moment the proposition can only be described as being paradoxical." Reports as to the effect of plasmoquine in preventing relapses are contradictory; the Commission is unconvinced that there are fewer relapses after a course of quinine and plasmoquine, than after a course of quinine alone. As regards the use of plasmoquine to destroy crescents it " has a powerful action against them. The doses for preventing crescent-carriers from infecting mosquitoes should be given twice a week during the period when crescents are present in the peripheral blood . . . trials should now be conducted with doses up to 0·02–0·04 grammes to ascertain the minimum effective non-toxic dose." Gametocytes are found in the blood of only a small proportion of malaria patients, they are more numerous in recent cases than in chronic cases and relapses, and the old view that they were a sign of developing immunity has been reversed. They are therefore more common in children, living in malarious places, than in the relatively immune adults, and little can be accomplished in highly endemic areas without thorough treatment of the babies and children; it is the difficulty of accomplishing this which makes most attempts at mass treatment ineffective. The number of gametocytes varies with the number of asexual parasites present in the blood about ten days before, as shown in the chart reproduced from a paper by David Thomson. The gametocytes probably arise from the asexual parasites, and as the latter decrease, with the development of immunity, so do the former.

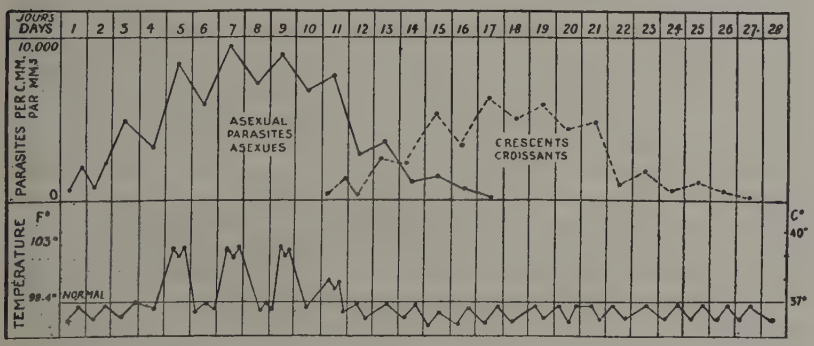


Diagram showing tertian paroxysms with corresponding outbursts of crescents ten days later.

[Reproduced from *Annals of Tropical Medicine & Parasitology.* 1911. Vol. 5. p. 62.]

Hydroquinine is the only alkaloid which is superior to quinine as regards its tolerability and parasiticidal action. It has been successfully synthesized by Rabe, but the process is very costly. Several proprietary remedies containing hydroquinine, such as Malarcan and Tebetren, have been put on the market but, of course, they are still more expensive.

As regards Totaquina—the new standardized preparation containing all the alkaloids present in cinchona bark—this is made in two ways: type 1 is made by extracting the total alkaloids from cinchona bark, type 2 is made from the residues of quinine manufacture, with the addition of sufficient alkaloids to bring it up to the required standard.

When it is used in the ordinary therapeutic doses of 20 grains a day, type 1 gives the same good results as quinine, though 5 grains are not as effective as 5 grains of quinine. Type 2 is not so useful, and to obtain the same effect as is produced by a single dose of 5 grains of quinine, it is necessary to give 20 grains of totaquina type 2.

The therapeutic testing of drugs on the parasites of avian malaria is due to COPANARIS, the SERGENTS, GIEMSA, and MARKS; it was established as a routine practice by ROEHL. The avian malaria infections are of two types: (1) the proteosoma type (*P. relictum*) with schizonts in the peripheral blood; (2) the halteridium type (*Haemoproteus orizivorae* of Java rice-birds) which is employed to ascertain if the drug has a gametocidal action, for, in this type, the gametocytes are present in the peripheral blood, while the schizonts are in the endothelial cells of the internal organs. Unfortunately a drug, for example Fourneau 710, which is effective in bird malaria may have little effect on the infections of man.

"The new synthetic remedies now available are still in the experimental stage . . . the time has not yet come when any of these drugs can be recommended as substitutes for . . . quinine. It is not good practice to treat attacks of malaria in the acute stage with more than one of the specific drugs . . . the Commission does not at present recommend that a system of treatment with quinine plus plasmoquine ('quino-plasmoquine,' 'plasmoquine compound,' etc.) should be adopted for reducing the incidence of relapses. . . . It is no longer considered correct to use quinine or other specific remedy in large doses for prolonged periods, nor is it any longer considered correct to hold the view that relapses happen because patients are not treated early in the primary attack or are not given sufficient quinine in that attack. . . . It might be most unwise in some malarious countries (Africa, for example) to interfere too radically with the natural process by which the indigenous inhabitants acquire immunity to the disease." What is needed in areas such as Lagos where practically everyone harbours parasites, is "not that everyone in whose blood a few parasites are found should be treated with quinine . . . but that more intensive clinical investigation should be made to ascertain precisely to what degree chronic parasitism . . . is in fact harmful to the health of the children and adults concerned, and to discover precisely at what period of life curative or preventive action may be urgently necessary or would be most helpful." *W. F.*

DUBOIS (A.). Le traitement du paludisme selon la Commission de la S.D.N. [**The Treatment of Malaria according to the Commission of the League of Nations.**]—*Bruxelles-Méd.* 1933. Sept. 10. Vol. 13. No. 45. pp. 1301–1308.

The author finds that the Report is too theoretical and is opposed to practical experience.

He reviews and criticizes the salient points of this Report (see above). He cannot agree that specific treatment should await the determination of the species of the infecting parasite, the virulence of the particular strain, and the resistance of the patient. It sometimes happens that the species cannot be diagnosed from the scanty rings found in the blood; delay is dangerous; it is safest to assume that they are subtertian parasites and to treat the patient accordingly. It requires long observation to find out the degree of a patient's resistance to the

infection ; it would be wrong to postpone treatment until this had been done. How, too, is one to discover with what particular strain a patient is infected ? Such are the counsels of the laboratory worker, rather that those of the practising physician. It is stated in the Report that quinine has no action until the parasites are sufficiently numerous to cause fever or to be demonstrable in the peripheral blood. This cannot be correct, because infection in bird or man, following the inoculation of infected blood, can be completely stopped by treatment before the parasites become abundant in the circulation.

The author vigorously opposes the doctrine of the Report, that specific treatment should not be begun as soon as a diagnosis of malaria is made. In the majority of French colonials, who take prophylactic quinine, the primary attack is not very severe ; it yields readily to prompt treatment with quinine, and frequently there is no relapse. To wait until the temperature comes down before giving quinine, or to permit several paroxysms to occur with the object of inducing immunity is to expose the patient to the risk of grave relapses and, above all, to the danger of blackwater fever. The cemeteries of Africa are full of such " *sujets d'expérience.*" The Report lays great stress on the importance of developing the patient's immunity ; but such immunity is only monovalent, and it has little solidity in places where strains of parasites are numerous and re-infections frequent. The author notes that Professor NOCHT dissociates himself more or less from the conclusions of the Report as regards delaying the administration of quinine, and he (the author) advises against an excessive temporization which might end in eternity " (*pour le patient bien entendu*)." *W. F.*

HOOPS (A. L.). **Observations on the Cure of Malaria with Atebrin.**— *Brit. Med. Jl.* 1933. June 10. pp. 993–995.

DUNCAN (David). **Atebrin in the Treatment of Malaria in Malaya.**— *Malayan Med. Jl.* 1933. June. Vol. 8. No. 2. pp. 79–90. [33 refs.]

Atebrin is cheaper and more effective than quinine.

Hoops and his colleagues in Malaya treated 253 patients with a week's course of atebrin. About half the cases were subtertian infections, and the other half were benign tertian. They were under observation from 3 to 9 months afterwards ; only 11, or 4·34 per cent. relapsed, and some of the " relapses " may have been fresh infections. The cost of a course of atebrin (15 tablets) is only 1s. 9d. as compared with 2s. 4d. which is the cost of a course (one ounce) of quinine. [See also HOOPS, *ante* p. 476.]

DUNCAN treated 400 Asiatic patients at the Singapore Naval Base. Fifteen women and 42 children were treated as outpatients (Atebrin administered to nursing mothers was excreted in the milk and found in the infants' urine) ; the remainder of the patients were male labourers who were treated in hospital. The adult dose was :— 0·1 gram of atebrin, three times a day for 6 days, together with 0·01 gram of plasmoquine, three times a day, for the first five days in subtertian infections. Children over 8 years old received the adult dose of atebrin. Treatment was equally effective when the drug was given in one daily dose instead of in three. There were no toxic symptoms due to atebrin. In a series of 168 cases treated with atebrin alone, not a single case suffered from abdominal symptoms ; but in another series which comprised 149 treated with plasmoquine and

atebrin, 22 patients suffered from severe abdominal pain while many more complained of considerable discomfort.

The results of treatment were excellent, and the relapses in 168 cases of benign tertian were only 10·7 per cent. in six months, as compared with about 50 per cent. with quinine treatment. Here again atebrin was considerably cheaper than quinine, and there was also a saving of several days treatment. *W. F.*

RONNEFELDT (F.). Dosierungsfragen bei Kindermalaria. [**Dosage Problems in Malaria in Children.**]—*Klin. Woch.* 1933. June 24. Vol. 12. No. 25. pp. 986–987.

The author studied in the American Mission Hospital, Liberia, the results of atebrin treatment in malaria in 37 native children and was enabled to draw indirect conclusions on the mode of action and dosage of the preparation.

His main point is that the amount of atebrin necessary for cure must be controlled by the number of parasites in the blood, not by the body weight. He noted that in the children the cure was often delayed, probably due to underdosage. He surmises that the drug acts directly on the parasite, so that higher dosage is required. Another factor which he considers plays a part in the delay in cure is rickets in the children. So far, he states, no practical method of quantitative estimation of atebrin in the blood has been described ; such a method would help to solve problems connected with the distribution of atebrin in the body.

E. D. W. Greig.

FISCHER (Otto). Beiträge zur Atebrinbehandlung der Malaria. [**Atebrin Treatment of Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 339–341.

Recently the author has treated all cases of malaria at the convalescent home in Tubingen with atebrin with continued success.

His results have been good not only in patients with malaria parasites in the blood, but also in patients suffering from the after effects of malaria in which the blood was negative ; thus considerable improvement was noted in splenomegaly, secondary anaemia and loss of body weight. Beyond more or less yellow colouration of the skin no bad after effects from the drug have been noted. No injury to liver function occurred. It acted satisfactorily in a case of malaria in pregnancy at the eighth month. A case of malarial neuritis with parasites in the blood rapidly improved under atebrin treatment. *E. D. W. Greig.*

CHOPRA (R. N.), GUPTA (Biraj Mohan Das) & SEN (B.). **Atebrin in the Treatment of Indian Strains of Malaria.**—*Indian Med. Gaz.* 1933. Aug. Vol. 68. No. 8. pp. 425–432.

Atebrin is not superior to quinine either in preventing relapses or as a prophylactic. Its action on asexual parasites is as sure but more gradual than that of quinine. Several slight toxic effects were noted.

The effects of atebrin were studied in a series of patients at the Carmichael Hospital for Tropical Diseases in Calcutta. Usually, the temperature went down on the second or third day of treatment, and by the fourth day the parasites had disappeared, excepting crescents, on which the drug had no effect. As compared with quinine, the authors

found " that the action of atebrin on the asexual forms of the parasites is gradual and not so rapid." They did not find that it was superior in preventing relapses in man—at least five cases out of 39 relapsed—and they also obtained ample evidence that relapses were common in the experimental malaria of monkeys. As regards prophylaxis, " so far as we can see it has no more true prophylactic action than the cinchona alkaloids." The toxic effects of the drug were slight: headache, depression, loss of appetite, abdominal discomfort, diarrhoea, malaise, all of which disappeared on stopping the drug. It appeared to have little if any depressing effect on the cardio-vascular system and may be detected in the urine for 20 days or longer. *W. F.*

GANGULI (P.). **Treatment of Malaria with Atebrin with Records of Blood Pressure and Electrocardiogram.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Sept. Vol. 37. No. 9. pp. 413–423. With 10 figs.

Atebrin has a slight irritant action on the mucous membrane of the stomach, otherwise it gives rise to no unpleasant symptoms. In some cases there is a slight lowering of blood pressure, such as might be expected in febrile persons lying in bed while on a limited diet. " Effect on heart muscle as seen by electrocardiogram usually showed no change in the myocardium." *W. F.*

CHORINE (V.). L'atébrine dans le traitement du paludisme. [**Atebrin in Malaria.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 773–775.

The author reports deaths, possibly due to atebrin.

Seventeen general paralytics were infected with benign tertian by intravenous inoculation of blood, and they were afterwards treated with atebrin. One of the patients had epileptiform convulsions, three others developed icterus, and two of them died. The symptoms appeared a few days after finishing the treatment, and though the author says that there is no proof that they were due to atebrin, he evidently suspects that they were. *W. F.*

MASSA (M.). Presenza ed eliminazione prolungata dell' atebrin, dimostrabile alla luce di Wood. [**The Wood Light for demonstrating Excretion of Atebrin.**]—*Riforma Med.* 1933. July 1. Vol. 49. No. 26. pp. 980–982.

The Wood light or the Wood filter is employed for determining fluorescence in small amounts, too small in some cases to be visible by the unaided eye. Atebrin in the urine and the faeces and, before being excreted, in the blood itself, gives rise to a fluorescent body obvious when the drug is taken in doses of 3 cgm. daily. In examining for this in urine the procedure is as follows: 10 cc. urine is rendered alkaline by addition of 1 cc. of a 10 per cent. solution of soda; it is then extracted with ether and evaporated. When treated with 2–3 cc. of concentrated sulphuric acid or with 70 per cent. alcohol, a marked fluorescence results, yellow with the acid, green with alcohol.

If daily examinations are made of the urine of a patient who has been taking atebrin, this fluorescence, though gradually diminishing, can still be recognized up to 60 or even 70 days after the treatment has ceased. *H. H. S.*

PATERSON (A. C.). **Report on the Treatment of Malaria by Atebrin and Plasmochin Simplex.**—*West African Med. Jl.* 1933. Apr. Vol. 6. No. 4. pp. 68–70.

Toxic effects followed a combined treatment with plasmoquine and atebrin.

Six patients suffering from subtertian malaria were given atebrin 0·1 gram and plasmoquine 0·01 gram three times a day for four days, except in one case where the plasmoquine was omitted. Each of them, including the one who had no plasmoquine, complained of a constant dull pain across the abdomen which, in one, was very severe and accompanied by vomiting. Except in one case, the pain began the day after the treatment was finished. *W. F.*

DIXON (H. B. F.). **A Report on Six Hundred Cases of Malaria treated with Plasmoquine and Quinine.**—*Jl. Roy. Army Med. Corps.* 1933. June. Vol. 60. No. 6. pp. 431–439.

The relapse rate of 250 cases of benign tertian treated with quinine was 25 per cent.; the relapse rate of 215 primary cases of benign tertian treated with plasmoquine and quinine was only 4·18 per cent.

The patients were European soldiers, their wives and children, treated by the author at the Connaught Military Hospital, Poona. The relapse rate of 250 persons treated with quinine alone, prior to July 1929, was over 25 per cent. From July 1929 the treatment consisted of 0·04 gram of plasmoquine and 20 grains of quinine daily; from September 1930 the dose of plasmoquine was reduced to 0·03 gram daily. The duration of treatment was 21 days. The patients were kept in bed for 5 days, and in hospital for at least 10 days; for the remainder of the period they were excused duty. "It was found absolutely essential to keep men from doing strenuous work while they were attending for their 21 days treatment." Treatment was instituted at the earliest possible moment. The period of subsequent observation was from $3\frac{1}{2}$ years to a minimum of 10 months. The average period was 2 years. There were no serious toxic symptoms, but with the 0·04 gram dose it was always possible to pick out the men in the ward who were on plasmoquine, by their grey, cyanotic appearance. "The reduction of the dose to 0·03 gram daily prevented any cyanosis whatever." The results of treatment were as follows:—Primary benign tertian: 215 cases, 9 relapses, 4·18 per cent. Relapsed benign tertian: 141 cases, 6 relapses, 4·7 per cent. Quartan: 5 cases, no relapses. Malignant tertian: the relapse rate was about 2 per cent. whether the patients were treated with plasmoquine and quinine, or with quinine alone. (See MANIFOLD, this *Bulletin*, Vol. 28, p. 1007.)

W. F.

SCHWETZ (J.), BAUMANN (H.), PEEL & DROESHAUT. Notes thérapeutiques sur le paludisme du Congo. [**Therapeutic Notes on the Malaria of the Congo.**]—*Rev. Méd. et Hyg. Trop.* 1933. Jan.–Feb. Vol. 25. No. 1. pp. 24–35.

An account of clinical quinine prophylaxis in native children.

Eighty-two native children were examined, and 92·6 per cent. were found to have parasites in their blood. Some were given a month's treatment with 0·25 gram of quinine daily, and the rest received 0·50 gram of cinchona febrifuge. The percentage infected was reduced

to 40 : but after three months without treatment it rose to 53. They were then given 0·25 to 0·50 gram of quinine daily for 1½ months, followed by the bi-weekly administration of the same doses for 3 months. At the end of this time the percentage of those infected was 24·6. The bi-weekly dose was continued for 3 months longer, but the infection rate was not reduced further. *P. falciparum* is the commonest parasite, *P. malariae* is common, but *P. vivax* is extremely rare. Parasites were very scanty in those children who remained infected at the end of the course and *P. malariae* was rare. Cinchona febrifuge (*Produits Roche*), which cost half the price of quinine, was found to be as powerful as quinine when given in larger doses. *W. F.*

KARAMCHANDANI (P. V.). **Parenteral *versus* Oral Administration of Quinine.**—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 445–473. With 3 figs. [99 refs.]

Injections of quinine should not be given except in special cases.

The author reviews the " literature " and describes his own experiments. Before he undertook these investigations he was a great advocate of the subcutaneous injection of quinine, but he is now convinced that (except in special cases) it almost amounts to malpraxis. Quinine administered orally, and retained, is as efficacious as when it is injected. Injections produce local necrosis and afford favourable sites for the development of tetanus spores which is favoured by quinine on account of its reducing properties. Tetanus may follow quinine injections, apart from any fault in technique. Tetanus spores may be transported from one part of the body, such as the intestine, to the site of the injury produced by the inoculation, as demonstrated by SEMPLE. In comatose and pernicious cases of malaria, where it is impracticable to give quinine by the mouth, it should be given intravenously as a 5 per cent. solution of the acid hydrobromide. In very obese people and in some children where the veins cannot be found, it may be injected subcutaneously as a dilute solution of 5 grains of quinine acid hydrobromide in 10 cc. of water or saline. Injections should be given slowly. Moulds grow readily in solutions of quinine ; such solutions, therefore, should not be stored in rubber-capped bottles, but should be freshly prepared. Boiling for 10 minutes does not alter the composition of the solution. The administration of quinine by injection should always be undertaken by the medical officer himself, and never relegated to his subordinate staff. *W. F.*

GROOTHOFF (A.) & HENRY (T. A.). **The Preparation, Analysis and Standardisation of Totaquina.**—*Riv. di Malariologia.* 1933. Jan.–Feb. Vol. 12. No. 1. pp. 87–91.

In this paper the authors give the analysis of the four samples of totaquina, which were tested by Professor GIEMSA in avian malaria (see below, p. 848). Totaquina is made in two ways. Type 1 is made by extraction of the total alkaloids of suitable bark ; Type 2 is prepared from the alkaloidal residues of quinine factories, with sufficient quinine added to bring it up to the required standard.

Two of the samples, A and B, were made by extraction of the total alkaloids from the bark of *Cinchona succirubra* and C, which gave the best therapeutic results, from the bark of *C. robusta*. A, B, and C were whitish powders, completely soluble in dilute sulphuric acid. Sample H was prepared from residual alkaloids, with sufficient quinine added

to bring the mixture up to standard. It was a greyish-brown powder, almost completely soluble in dilute sulphuric acid, forming a brown solution. Totaquinas of Type 2 contain far more cinchonine than those of Type 1, and much less cinchonidine . The results of the examination of these samples by different workers were remarkable for their concordance. The methods of analysis have been published in the document, League of Nations, Health Organisation, Malaria Commission (C.H. Malaria 183).

As regards the preparation of Type 1 totaquina, laboratory experiments showed that, starting with a *C. succirubra* bark containing 5·4 per cent. of alkaloids, it was possible to recover 5·2 per cent. in the form of totaquina. The alkaloids were extracted with boiling benzene from the powdered bark previously mixed with slaked lime, and were removed from the benzene solution by shaking with dilute sulphuric acid. The aqueous alkaloidal solution so obtained was decolourized by heating with charcoal, filtered, and while still hot, run into excess of sodium hydroxide solution to precipitate the alkaloids. *W. F.*

GIEMSA (G.). Etude comparative d'échantillons de totaquina, de quinine et d'hydroquinine au point de vue de la toxicité et de l'efficacité dans le paludisme des oiseaux. (**Comparative Study on Samples of Totaquina, Quinine and Hydroquinine regarding their Toxicity and Efficacity in Bird Malaria.**)—*Riv. di Malariologia.* 1933. Jan.–Feb. Vol. 12. No. 1. pp. 70–86. With 1 fig. [12 refs.] English summary pp. 258–259.

Four samples of totaquina proved less effective in avian malaria and more toxic to rabbits, than quinine and hydroquinine.

The action of a drug upon the proteosoma of birds is a valuable indication of its action in human malaria, but the test is not infallible ; for example, dimeplasmin is effective in avian but not in human malaria, and salvarsan is effective in human but not in avian malaria. The route of administration is important ; for example, hydroquinine is hardly equal to quinine when injected subcutaneously into birds, but it is superior to it when given *per os*. The standard method of testing efficiency is to give the first dose of the drug *per os*, 3 to 4 hours after an inoculation of the virus, and to repeat it daily for 5 days.

The " margin of efficacity " of the drug under test is the relation of the smallest dose which prolongs the incubation to the largest dose which can be well supported. RÖHL obtained for quinine a margin of efficacity of 1 : 4, and for plasmoquine, one of 1 : 30. A method of holding birds for the purpose of administering drugs by the oesophageal tube is described and figured.

Four samples of totaquina (A, B, C, H) were compared with quinine and hydroquinine. Some of the fluid is often returned when the drugs are administered to birds *per os*, and a portion of the drugs may remain unabsorbed when they are inoculated under the skin ; therefore comparative toxicity tests were made by intravenous injections into rabbits. The minimum lethal doses in milligrams of drug per kilogram of rabbit was :—Totaquina C. 23·0, B. 25·2, H. 25·5, A, 34·5 ; Quinine, 39·5 ; Hydroquinine, 39·6. The therapeutic value was compared by the administration *per os* to canaries, of six daily doses, beginning on the day of infection, the efficiency of a drug being shown by the number of days which elapsed before parasites were found in the blood. The results, with doses of 1 milligram, were as follows :—Hydroquinine,

7·4 days; Quinine, 6·2; Totaquina C. 4·8, H. 4·2, B. 2·6, A. 1. In short, all four samples of Totaquina, except A, were more toxic than quinine, and all were less effective therapeutically, especially A.

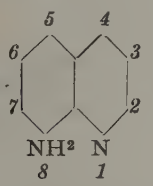
W. F.

Stone (C. T.), Gaskill (R. C.), Sanders (J. P.), Barton (J. C.), Schulze (V. E.) & Dawson (W. T.). **Hydrocinchonidine and Hydrocinchonine in Malaria.**—*Amer. Jl. Trop. Med.* 1933. July. Vol. 13. No. 4. pp. 437–442. With 1 chart.

Hydrocinchonidine and Hydrocinchonine are closely related to quinine (methoxy-cinchonidine) and quinidine (methoxy-cinchonine); they occur naturally in cinchona bark in small quantities, but are usually prepared by catalytic hydrogenation of the corresponding common alkaloid, *e.g.*, hydrocinchonidine from cinchonidine. The authors treated 8 patients with 0·5 grams of hydrocinchonidine daily, and 11 with hydrocinchonine in the same doses, over a period of 4–6 days. The 19 patients comprised cases of both benign and malignant tertian malaria. The results were good, but they "do not necessarily indicate superiority to quinine or quinidine." Some of the patients treated with hydrocinchonine suffered from nausea and vomiting, but this may have been due to causes other than the drug. *W. F.*

Fourneau (E.), Tréfouel (J.), M. et Mme., Bovet (Daniel) & Benoit (G.). Contribution à la chimiothérapie du paludisme. Essais sur les calfats. (Deuxième mémoire.) [**The Chemotherapy of Malaria. Tests on Paddy-Birds.**]—*Ann. Inst. Pasteur.* 1933. May. Vol. 50. No. 5. pp. 731–744. [29 refs.]

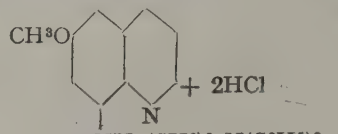
The authors prepared 48 substances derived from aminoquinoline-8, possessing consequently the nucleus :—



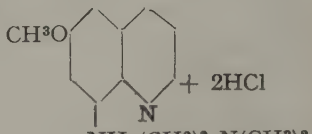
Thirty-eight possessed a parasiticidal action in bird malaria. Most of them were unstable and soon became toxic, but some appeared suitable for therapeutic use, particularly (1) 852, (2) 574 (6-methoxy-8-dimethylamino n-propylamino quinoline), (3) 710 (with diethylamino in place of dimethylamino), (4) 728 (8-diethylamino n-propylamino quinoline), (5) 735 (6-methoxy-8-diethylamino n-amylamino quinoline). Judging from their action in bird malaria and their toxicity for rabbits, these drugs are superior to plasmoquine. For example the chemotherapeutic index, in paddy-birds, of 735 is 1/150 while that of plasmoquine is 1/40, and the toxicity of 735 for rabbits is only about half that of plasmoquine. The chemotherapeutic index of 710 is 1/100. The chemotherapeutic index = the minimal daily dose which will cure in 5 days, divided by the maximum single tolerated dose. The tests were made on paddy birds (*Padda orizivora*) infected with *Haemoproteus orizivorae*. Drugs which are active against this parasite are active against the gametes of human malaria. *W. F.*

Massias (C.). Le " 574 " associé au quiniostovarsol dans le traitement du paludisme à *Plasmodium vivax* et à *Plasmodium praecox*. [**574 associated with Quiniostovarsol in the Treatment of Malaria.**] —*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 590–594.

The author treated 43 patients with dichlorohydrate-6-methoxy-8-dimethylamino-propylamino-quinoline (574), and he gives the following formula, with that of 710 for comparison.



Formula 710



Formula 574

He prefers it to 710, because of its slight toxicity, and its stability in a tropical climate. The daily doses employed were 0·08 gram of 574 with 1 gram of quiniostovarsol, divided into two parts and given just before meals, in cachets or tablets. A course of treatment lasted 7 to 10 days and was repeated after a week's interval. Two patients complained of vomiting. In no case did parasites persist as long as 7 days. In 8 cases where crescents were present, these disappeared within 2 to 6 days. Alkaline drinks, such as Vichy water or sodium bicarbonate, favour tolerance of the drug. *W. F.*

Marchoux (E.) & Chorine (V.). Un corps nouveau actif sur *Plasmodium vivax*. [**A New Drug for Benign Tertian Malaria.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 28. pp. 1463–1464.

The new drug, 915, gives, the authors find, a permanent cure in most cases.

This concerns a new quinoline derivative, 915, from Fourneau's laboratory. It is said to be the salt of acetylamino-oxyphenylarsenic acid with diethylamino-undecylamino-methoxyquinoline. Combined in the proportion of two parts of 915 to one of stovarsol, this product consists of fine needle-like crystals. It is given by the mouth in cachets. The authors treated 7 cases of naturally contracted benign tertian and 37 cases of induced therapeutic malaria with the drug. They conclude that it cures most cases of benign tertian without subsequent relapse when 0·3 grams are given daily for 6 days. It is non-toxic, even in double these doses. Only one patient suffered any inconvenience; this was a boy of 16 who took 0·6 grams a day for 6 days and complained of slight epigastric pain. The activity of the preparation is not due to the stovarsol; two patients who were treated with pure 915 were cured without relapse. *W. F.*

Charron (E.). Sur un nouveau dérivé de la quinine à action gamétocide. [**The Gametocidal Action of a New Quinine Derivative.**]—*Rev. Méd. et Hyg. Trop.* 1933. Jan.–Feb. Vol. 25. No. 1. pp. 59–61.

The author investigated the action of quinine derivatives on cultures of the malaria parasites. He suggests that the gametocyte arises from the schizont.

Dihydroquinine was prepared by the hydrogenation of quinine in the presence of colloidal palladium. Dihydroquinamine was prepared from this, and from this again a number of other products ; among them diethanol dihydro quinamine. This substance appears to have a powerful action not only on the schizonts but also on the gametocytes of *P. falciparum.* The experiments on which these conclusions are based were made by adding the quinine derivatives under examination to cultures of malaria parasites in test tubes. The author suggests that the gametocyte has its origin in a sexual cell liberated from the schizont at the time of the rupture. *W. F.*

Koressios (N. T.). Essais de sérothérapie dans le paludisme. (**An Attempt of Serotherapy in Malaria.**)—*Riv. di Malariologia.* 1933. Mar.–Apr. Vol. 12. No. 2. pp. 353–362. English summary (7 lines) p. 453.

The author inoculated rabbits once a week, for a period of nine weeks, with the blood of patients suffering from benign tertian, his object being to prepare a serum containing malaria antibodies. Seven patients suffering from subtertian were inoculated with this serum, and one was inoculated with a serum prepared by inoculating rabbits with blood containing *P. falciparum.* The author states that the serum acted like feeble doses of quinine, and, in about 10 days, brought down the fever and reduced the number of parasites. He concludes that it contains a specific, antiparasitic substance [but on reading the details of the cases, one is not convinced of this]. The serum is, naturally, strongly haemolytic, and may produce great anaemia and fever.

W. F.

Lio (Giuseppe). Malaria ed autoemoterapia. [**Autohaemotherapy in Malaria.**]—*Riv. Sanitaria Siciliana.* 1933. Feb. 15. Vol. 21. No. 4. pp. 265–268. English summary (2 lines).

The method employed by the author is so simple and easy of application and the results as recorded by him are so striking that others will doubtless make trial of it and its true value be determined. Twenty-six patients are referred to, 24 natives of Somalia and two others. All were infected by the subtertian parasite. His technique was to draw off 10 cc. of blood from the median cephalic vein, without added citrate and inject it (never less than 5 cc. and usually the whole amount) intramuscularly into the gluteal region on alternate days, 4–7 in all, usually 3 injections being given after the fever disappeared. Nineteen of the 24 had no quinine, 2 were given the blood injections after quinine had proved ineffectual, the remaining three had at the same time as the injections 1 gm. quinine by mouth.

In 16, the fever disappeared after the first injection, in 3 after the second, 3 after the third and 2 after the fourth. Six were given quinine after the injections were ended and 2 had quinine and arsenic ; 16 had neither.

Of the two other patients, one was intolerant of quinine ; a dose of 20 cgm. gave rise to headache, tinnitus, blurred vision, drowsiness, vomiting, diarrhoea, cardiac disturbance and rash. Six injections were given on alternate days, as in the other cases, and the fever fell at the third. The other patient proved very resistant to the effect of quinine. For 8 days he took 2 gm. daily by mouth and for 5 days he had intramuscular injections, but the parasites persisted. He was given four blood injections ; the fever disappeared after the first.

[There is no mention as to the length of time the patients were kept under observation subsequently, to see if any relapse occurred.]

H. H. S.

Boyd (Mark F.) & Stratman-Thomas (Warren K.). **Studies on Benign Tertian Malaria. 2. The Clinical Characteristics of the Disease in Relation to the Dosage of Sporozoites.**—*Amer. Jl. Hyg.* 1933. May. Vol. 17. No. 3. pp. 666–685.

Mosquitoes which are heavily infected are more regular producers of infection, and the disease produced is more severe, longer, more prone to relapse, and has a shorter incubation period than is the case when the infection is conveyed by lightly infected mosquitoes.

Sixty-one mental patients at the Florida State Hospital were infected with benign tertian malaria by laboratory-bred *A. quadrimaculatus* ; a minimum of two mosquitoes being employed in each case. Thirty-eight batches of anopheles were used. Ten mosquitoes of each batch were dissected before any therapeutic feedings were made, and the batches were classed provisionally according to the numbers of oöcysts. Subsequently, they were all dissected and a final classification was made. Those batches in which no mosquito contained more than 30 oöcysts were classified as " poor." Those in which at least half the mosquitoes contained over 50 oöcysts were classified as " good." Intermediate batches were " fair."

Where " poor " batches were employed, there were 75 per cent. of failures. In successful cases, the incubation period averaged 15·7 days. Spontaneous cure, without treatment, occurred in 90 per cent The attack generally began with intermittent tertian fever, and there were fewer chills. The relapse rate was 30 per cent.

When " good " or " fair " batches were employed, there were about 10 per cent. of failures. In successful cases, the incubation period was 13 to 14 days. Spontaneous cure occurred in 63 per cent. of those infected with the " fair " batches, and in 51 per cent. of those infected with the " good." The attack generally began with intermittent quotidian, and there were more chills. The relapse rate was about 55 per cent.

In 7 cases, it was " deemed advisable to terminate infection—while it was still clinically active," by Sinton's treatment. Five of these cases relapsed within 5 to 7 months. Fifty-four cases terminated spontaneously, and were then given Sinton's treatment prior to discharge; there were no clinical recurrences in this group. The maximum of success in inoculation occurred when four or more mosquitoes were allowed to bite, but there was no consistent relationship between the number of mosquitoes and the severity of the attack. The attack may begin as remittent fever, intermittent quotidian or intermittent tertian. A remittent fever was observed only at the beginning of an attack ; it occurred in one-third of the cases, and was usually succeeded by intermittent quotidian, which was the most common type. The fever in relapses was intermittent. When all three types were included in an attack, they followed the sequence given above. *W. F.*

Mayne (Bruce). **The Injection of Mosquito Sporozoites in Malaria Therapy.**—*Public Health Rep.* 1933. Aug. 4. Vol. 48. No. 31. pp. 909–916.

Sporozoites can be kept alive in citrated blood for several days, and may be sent by post, in this medium, for use in distant institutions.

The salivary glands of an infected mosquito are flooded with 0·5 cc. of sterile 2 per cent. sodium citrate on a glass slide. They are then taken up in a syringe and injected into a rubber-capped bottle containing 10 cc. of freshly-drawn, defibrinated human blood mixed with 1 per cent. dextrose. The bottle is kept at a temperature of 50°F. (10°C.). At higher temperatures, there is danger of an overgrowth of contaminating bacteria; at lower temperatures, the sporozoites perish. They will remain alive and infective, at 10°C. in this medium, for as long as 5 days. It is troublesome and costly to send infected mosquitoes to distant institutions, but bottles containing sporozoites can be sent by post. Therapeutic inoculations, which are given preferably by the intramuscular route, are followed by incubation periods of 10 to 12 days in subtertian, 13 to 22 in benign tertian, and 32 in quartan. An instance of the extraordinary power of a single mosquito to infect several people is given by the author; a single insect infected more than 10 people by biting, and when its salivary glands were subsequently dissected, they were found to contain sufficient sporozoites to infect several more by inoculation. Two per cent. sodium citrate solution may be used instead of the blood medium, but apparently the sporozoites die sooner. *W. F.*

Sautet (Jacques). A propos des associations parasitaires dans le paludisme. Application à la malariathérapie. [**Mixed Infections.**] —*Rev. Méd. et Hyg. Trop.* 1933. Jan.–Feb. Vol. 25. No. 1. pp. 50–54.

It is difficult to distinguish the young rings of the three species of malaria parasites from one another, or to be sure that a patient with one species of parasite in his blood is free from latent infection with another. It is advised, therefore, that when a wild strain of malaria is required for malaria-therapy it should be obtained from a patient with relapsing benign tertian who has not been exposed to infection for at least a year. *W. F.*

Mollaret (Pierre). L'injection de sang comme procédé de déclenchement des accès, dans les échecs ou les arrêts du paludisme thérapeutique. [**Injections of Blood to provoke Malaria Paroxysms.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 19. pp. 299–300.

In the practice of malaria-therapy, it sometimes happens that spontaneous cure occurs before a sufficient number of paroxysms has occurred. The author has found that the subcutaneous or intramuscular inoculation of 5 to 10 cc. of blood is far more effective than injections of adrenaline or a vaccine, in resuscitating and stimulating the infection. The patient's own blood appears to act as well as another's. *W. F.*

Boyd (Mark F.) & Stratman-Thomas (Warren K.). **A Note on the Transmission of Quartan Malaria by** *Anopheles quadrimaculatus.*—*Amer. Jl. Trop. Med.* 1933. May. Vol. 13. No. 3. pp. 265–271.

Patients were successfully infected by the bites of laboratory-bred mosquitoes.

Twenty-five laboratory-bred *A. quadrimaculatus* were fed on a patient who had been infected with *P. malariae* by means of blood

inoculation. The mosquitoes were kept at 20°C. Eighteen died within 30 days and oöcysts were found in 6. On the 32nd day, one of the remaining mosquitoes fed on a woman, and on the 39th day another fed on her. These two mosquitoes died a few days later, and sporozoites were found in both. Twenty-seven days after the first feed, quartan parasites were found in the woman's blood.

A second strain was obtained by feeding *A. quadrimaculatus* on a woman with a naturally acquired quartan infection. About 32 per cent. of the mosquitoes which fed became infected, and the infection was conveyed to other persons by their bites, The incubation period of *P. malariae* in the mosquito is 30 to 35 days at 20°C.; *P. vivax*, 16 days; *P. falciparum*, 22. The incubation period of *P. malariae* in man is also longer than that of the two other parasites. *W. F.*

MAJID (Syed Abdul). **Note on Some Unsuccessful Attempts to infect a Monkey by Injections of Living Malarial Sporozoites.**—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 475–477.

A very young specimen of *Silenus rhesus* (*Macacus rhesus*) received two subcutaneous and one intraperitoneal injection of living sporozoites from the salivary glands of three *A. culicifacies* found infected in nature. Thick and thin film examinations were made for a period of about 100 days after the first inoculation, and for 40 days after the second. The results were negative. [GREEN similarly obtained negative results in the inoculation of *Silenus irus* (*Macacus cynomolgus*) with sporozoites from mosquitoes fed on human cases of subtertian malaria [this *Bulletin*, Vol. 29, p. 702].] *W. F.*

BENARROCH (E. I.). Observations sur l'exflagellation des microgametocytes du paludisme humain. (**Observations on the Flagellation of the Microgametocytes of Human Malaria.**)—*Riv. di Malariologia.* 1932. Sept.–Oct. Vol. 11. No. 5. pp. 610–614. English summary (7 lines) p. 750.

Five untreated patients were examined 45 times—with the result that exflagellation of gametocytes was seen twice in one patient, and once in each of the others. Three treated patients were examined 20 times but, in them, no gametocytes were observed to flagellate. Anopheles fed on patients where flagellation is not present do not become infected. Occasionally it happens that no infected mosquitoes can be found although both anopheles and gametocyte carriers are very numerous; it is suggested that at such times and seasons the gametes have temporarily lost their power of flagellating and, consequently, of infecting anophelines. *W. F.*

CHORINE (V.) & GILLIER (R.). Recherches sur le mécanisme de la réaction de Henry. [**The Mechanism of Henry's Reaction.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 28. pp. 1419–1420.

Neither melanin nor ochre pigment produces a positive Henry's reaction in rabbits.

HENRY considers that his reaction is due to the action of the malaria parasite on the red cells, whereby the parasite transforms the haemoglobin into melanin, and forms the ochre pigment, which accumulates in the liver, by destroying the red corpuscles. The authors inquired if

melanin or ochre pigment inoculated into rabbits would produce a positive Henry's reaction. They injected melanin from a horse's sarcoma, because ox-eye pigment was unsuitable for intravenous injection. The ochre pigment they produced in abundance by inoculating rabbits intravenously with water. Neither of these procedures caused the rabbit's sera to give a positive Henry's reaction. *W. F.*

Moldawskaja-Kritschewskaja (W. D.), Gritzay (P. K.) & Uman (G. M.). Das Problem der Dauerinkubation bei Malaria im Lichte der Melanoflokkulationsreaktion. [**Prolonged Incubation Period of Malaria Studied in the Light of the Melanoflocculation Reaction.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. May. Vol. 37. No. 5. pp. 252–255.

The problem which the authors sought to solve with the help of the melanoflocculation reaction (RMF) was, whether the cases of malaria met with in the spring of the year had contracted the infection in the previous autumn and were incubating it until it became manifest in the spring or if they were examples of latent infection with resultant changes in the body.

The investigations were carried out at the malarial village of Eschar (S. Russia), and were commenced in March 1932. 24 persons were investigated, none of whom gave a history of malaria. Blood examination showed that none of the 24 had parasites in the blood; in 3 the spleen was enlarged. The RMF was negative in 3, doubtful in 2, positive in 19. Of the 19 positive, 10 developed attacks of malaria, 3 in April, 3 in May, 4 from June to October; 9 are under observation and have had no attacks. In some of these cases *P. vivax* appeared in the blood and the spleen became enlarged, From their observations the authors conclude that the question of the " prolonged incubation period " in early spring cases of malaria must be revised by means of the RMF in view of the possibility of their being cases of latent infection. In old-standing latent malaria there are no clinical manifestations that can be determined by accurate investigation. The RMF is a pathognomonic reaction for malaria and can be employed as a useful diagnostic measure long before clinical signs appear.

E. D. W. Greig.

i. Le Bourdellès (B.). Malaria-floculation et paludisme chronique. [**Henry's Malaria-Flocculation in Chronic Malaria.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1933. June 12. 49th Year. 3rd Ser. No. 19. pp. 744–752.

ii. Théobalt (E.). La malaria-floculation de Henry. Etude de cent cas cliniques. [**A Hundred Clinical Cases studied by Henry's Reaction.**]—*Ibid.* pp. 753–755.

i. The results of Henry's reaction in the examination of 204 persons who had formerly suffered from malaria support the view that repatriation to a non-malarious country is soon followed by complete cure, and that the recorded cases of infection persisting over years are examples of an exceptionally rare condition.

Thirty-six healthy persons who had suffered from malaria during a short residence in a malarious country—many of them about 14 years before—gave 33 negatives, 1 positive and 2 feeble positives. Twenty-three persons showing no signs of malaria, but who had lived for many

years in an endemic area, and had suffered repeatedly from it before their repatriation to France, gave no positives. One hundred and forty-five persons who had lived in an endemic country and had probably suffered from malaria, also gave no positives.

The serum of a blood-donor was examined. This man had lived in the tropics but he had never had an attack of malaria, nor were parasites ever found in his blood; yet its inoculation infected his two children with quartan malaria. The result of Henry's reaction was massively positive, and the author considers that the test should always be applied in the case of donors where there is any likelihood of latent malaria. This paper contains a list of reported cases of malaria persisting over long periods, and a concise review of the results of Henry's reaction.

ii. The author gives the results of Henry's reaction applied to a hundred soldiers who had returned from the colonies. These were positive in 30 and accorded with the "histories", clinical signs, and blood examinations. None of the 70 negative cases showed signs of malaria while in hospital, nor were any of them sent to hospital, on account of malaria, for a period of two years. *W. F.*

Le Bourdellès (B.) & Fribourg-Blanc (A.). Malaria-floculation et malariathérapie. [**Malaria-Flocculation (Henry's Reaction) and Malaria-Therapy.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1933. July 17. 49th Year. 3rd Ser. No. 24. pp. 1013–1022. With 1 chart.

Henry's reaction was investigated in 9 cases of therapeutic inoculation. It was negative before inoculation, but became gradually positive after 2 to 10 attacks. It was never positive during incubation. When the patient was cured it became negative. It was positive in two cases, ten and five months after inoculation, but became negative a month later. It was negative in six cases, examined from 8 months to 7 years after infection. In 8 cases, the serum albumen decreased and the globulin increased as the reaction became positive, and the protein quotient was consequently lowered; but such alterations in the proteins of the blood also occur in diseases in which Henry's reaction is negative, and in some cases of malaria the reaction is sometimes strongly positive when the protein quotient is unaltered. The author therefore concludes that alteration of the protein quotient does not account for flocculation. [See Tareev and Gontaewa, *ante*, p. 487.] *W. F.*

Biasiotti (Marcello). La reazione di Henry nella diagnosi sierologica della malaria. [**Henry's Reaction in Diagnosis of Malaria.**]—*Policlinico.* Sez. Med. 1933. Aug. 1. Vol. 40. No. 8. pp. 557–568.

After describing Henry's two tests—Melanoflocculation and Ferroflocculation—the author relates his own experiences in a considerable number of cases: 154 patients in their first attacks and 47 in relapses, 25 normal individuals and 25 suffering from diseases other than malaria, such as typhoid, paratyphoid, syphilis, eruptive fever.

The malaria patients were practically all cases of infection with *P. falciparum*, who had been under intensive treatment with quinine and whose blood was negative for parasites. Nearly all the tests were carried out during apyrexia (as recommended by Henry). In six nerve cases

(five general paralytics and one encephalitic) the reaction usually became positive after the 6th-7th access of fever (in one patient after the second). He found that the use of quinine in large doses, plasmoquine, atebrin, etc., which brings down the temperature and drives the parasites from the peripheral blood, does not modify the reaction till after a long time ; the reaction remains as positive evidence of earlier infection.

In brief detail the results were :—

1. Among 154 primary malaria patients the reaction was positive in 125.
2. Among 47 relapse cases, it was positive in 41.
3. It was constantly negative in the 25 normal individuals.
4. Similarly negative in the 25 suffering from other diseases.

He, therefore, confirmed Henry's work in finding the reaction positive in the apyrexial periods of both acute and chronic malaria, weakly positive or frankly negative in the febrile accesses ; negative also in well treated cases who have had no attacks for several years ; useful, consequently, in those in whom malaria is suspected but in whose blood parasites are not found and whose spleens are not enlarged. From the tables presented it will be seen that in a large majority the two tests are in agreement ; for cases where one is positive and the other negative the tables must be consulted as the disagreements are too irregular for more than a summary statement, to the effect that in the primary malaria patients 31 gave a melanoflocculation alone whereas only 3 gave the ferro- and not the melanoflocculation; in the relapse cases 9 gave the former and not the latter, while in one only was the reverse seen. In the paralytic patients the tests were in agreement in every case. *H. H. S.*

Liviérato (S.), Vagliano (M.) & Constantacato (G.). Utilisation d'un nouvel antigène pour le diagnostic de la malaria par la méthode de floculation. [**A New Antigen for Henry's Reaction.**]—*Grèce Méd.* 1932. Nov.–Dec. Vol. 31. No. 11–12. 177–178.

The sac of a cuttle-fish with its contents is cut up into small pieces and put into a sterile tube ; 40 cc. of sterile distilled water are added, and 0·02 cc. of formalin. After 24 hours at room temperature, the supernatant fluid is pipetted off ; it is kept in the ice-chest for two months before use, and is shaken daily. It is diluted to make a slightly blackish fluid just before use. The results are the same as those obtained with Henry's ox-eye melanin. (See this *Bulletin*, Vol. 29, p. 716; the same paper from another source.) *W. F.*

Panagia (Antonino). I parassiti della malaria filtrano attraverso le candele porose ? (**Do Malaria Parasites pass through Porous Filters ?**)—*Riv. di Malariologia.* 1933. Jan.–Feb. Vol. 12. No. 1. pp. 115–117. English summary p. 260.

The author remarks on the work of Ascione and Mariotti who reported producing malaria by injecting the filtered blood and cerebrospinal fluid of malarious patients into healthy subjects (*ante*, p. 487 and Marchoux *et al*) ; they used Berkefeld V and N.

In explanation they put forward two hypotheses : (1) that the merozoites in the blood underwent such modification that they could pass the filter, or (2) that the parasite was present in a "filtrable phase," capable of regeneration later to produce the disease [the difference would appear to be small].

The author took blood from two patients, one with subtertian infection, the other with quartan, 5 cc. in each case and mixed it with 45 cc. of isotonic citrate and chloride of sodium, and filtered the former through Chamberland F, the latter through this and Berkefeld V. He injected intravenously one person with the subtertian blood filtrate and 6 with the quartan. The first suffered in half an hour with shivering and a rise of temperature to 38°C., but though all seven were carefully observed for 2 months, they gave no indication of malarial infection. The author asks whether *P. vivax* may behave differently as regards filtration from the other malaria parasites. [As Ascione and Mariotti's experiments were with paralytics they probably used benign tertian blood, but their article does not state this as a fact.]

H. H. S.

Zozaya (Carlos) & Espinel Sabogal (Samuel). Sobre la pretendida filtrabilidad del *Plasmodium vivax*. [**The So-called Filtrability of** *P. vivax*.]—*Medicina Países Cálidos*. Madrid. 1933. July. Vol. 6. No. 4. pp. 310–325. [12 refs.]

The authors, referring to the reports of Ascione and Mariotti and Panagia, state that in connexion with this question three distinct problems arise : 1. Are there filtrable forms of the plasmodium, with corresponding biological properties, analogous, *e.g.*, with *Myco. tuberculosis* ? 2. Can the plasmodium under certain circumstances pass the barrier between the blood and the cerebrospinal fluid ? 3. If so, what data can we obtain to elucidate obscure points concerning the cerebrospinal fluid, its circulation, re-absorption, etc. ?

Details are given of ten observations on patients suffering from some form of nervous disease and inoculated with benign tertian parasites, and the authors conclude : (1) that they have been unable to confirm the findings of Ascione and Mariotti ; (2) that in one patient among five inoculated with cerebrospinal fluid, clinical symptoms resembling those of malaria were produced, but no parasites could be detected in the peripheral blood ; whether the symptoms were malarial in nature calls for further investigation ; (3) that there is a possibility that the blood parasites may cross the barrier but the questions then at issue would be whether there was any biological [? structural] modification or unusual meningeal permeability.

H. H. S.

Troisier (J.) & Modaldi (T. de Sanctis). L'hématozoaire du paludisme passe-t-il à travers les filtres ? [**Is the Malarial Haematozoon a Filter-Passer ?**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 20. pp. 347–350.

The authors filtered a 10 per cent. mixture of blood and isotonic citrate solution through Chamberland L^2 candles. The results were negative and confirmed those of Marchoux [see p. 487, above].

W. F.

Bouyoucos (B.). La mobilisation des hématozoaires vers la circulation périphérique sous l'influence de l'adrénaline. [**Appearance of Haematozoa in the Peripheral Circulation under the Influence of Adrenalin.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 594–600. [12 refs.]

In order to obtain accurate information as to the value of injections of adrenalin in the diagnosis of malaria, the author has carried out a series of careful observations in which, by the use of a faultless technique he has been certain before the administration of the drug that malarial parasites were absent from the peripheral blood of the cases. He has found that the adrenalin may cause parasites to appear in the blood but only in very small numbers, in 15 to 30 minutes after the injection. They remain there for two or three hours and then disappear. This action of adrenalin is the more marked the nearer its administration is to the last attack. Within a few days of the attack a positive result may be expected in three quarters of the cases. When it comes to a question of three to six months after, the result is generally negative.

C. M. Wenyon.

Neumann (Harry). Der Nachweis des parasitiziden Antikörpers bei der Malaria des Menschen. (**Demonstration of Parasiticidal Antibodies in Human Malaria.**)—*Riv. di Malariologia.* 1933. Mar.–Apr. Vol. 12. No. 2. pp. 319–334. With 1 fig. English summary (8 lines) p. 452.

In 2 out of 4 serum experiments a parasiticidal antibody was determined in the blood of patients suffering from benign tertian malaria.

The blood containing numerous parasites (schizonts) was drawn immediately before the onset of the fever, defibrinated and preserved for 48 hours in an ice chest. The blood, from which the serum was obtained, was taken about a day after the completion of the attack. The serum and blood containing the parasites was mixed, and allowed to remain in contact, and then injected intramuscularly into another patient, and the result noted. The author finds that serum from naturally infected patients does not protect against an attack of fever, when the sporozoites are dissected from the salivary glands of the mosquito and mixed with the patient's serum, and then injected intramuscularly into another patient. He explains this apparent contradiction to the results of the serum experiments with blood parasites by stating the insect sporozoites (which he regards as saprophytes) are changed in the human body into " blood or body specific " blood parasites, that is, their antigenic property is determined by the different host.

E. D. W. Greig.

van den Branden (F.) & Nelis (P.). Contribution à l'étude de l'hypocholesteremie dans le paludisme. [**Hypocholesteraemia in Malaria.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. June 30. Vol. 13. No. 2. pp. 215–217.

The authors employed Grigaut's colorimetric method for the estimation of cholesterol in the blood of 8 cases of malaria. The normal quantity, according to Grigaut, is from 1·5 to 1·8 grams per litre. The cholesterol was reduced to 0·68–1·0 in four of the cases ; in the other four, it was within normal limits. Examples from other authors are quoted which show that the cholesterin content is diminished in severe cases.

W. F.

KRITSCHEWSKI (I. L.) & HALPERIN (E. P.). Ueber die Medikamentfestigkeit der Erreger der Vogelmalaria (*Plasmodium praecox*). II. Der Einfluss des geschlechtlichen Vermehrungszyklus auf die Medikamentfestigkeit. [**The Effect of the Sexual Cycle of *Plasmodium praecox* of Birds on Drug Resistance.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 79. No. 1/2. pp. 149–162.

In this paper the authors communicate their researches on the problem of the retention or loss of experimentally produced quinine resistance in *Plasmodium praecox* in birds after the sexual cycle has taken place in *Culex pipiens*.

The authors carried out a series of carefully controlled observations which are fully detailed in a series of protocols. They reach the following conclusions as a result of their experimental work :—(1) That a quinine resistant strain of *Plasmodium praecox*, which has passed through a sexual cycle in *Culex pipiens*, sometimes retains, sometimes loses, its drug resistance. (2) The problem of the nature of drug resistance in protozoa (whether it is mutation or variation) does not lend itself to solution by this line of investigation. (3) Easily produced quinine-fast strains of *Plasmodium praecox* can be transmitted as such to healthy individuals by mosquito bites. *E. D. W. Greig.*

JERACE (Felice) & GIOVANNOLA (Arnaldo). L'azione sterilizzante della plasmochina sui gameti dei parassiti malarigeni e sua importanza profilattica. (**The Destructive Action of Plasmoquine on the Malarial Gametocytes and its Prophylactic Value.**)—*Riv. di Malariologia.* 1933. May–June. Vol. 12. No. 3. pp. 457–477. With 10 graphs. [22 refs.] English summary (8 lines) p. 652.

Several points are dealt with in this article to which an abstract cannot do full justice. Those who wish for more detail must consult the original.

The authors' researches were carried out on 32 patients with gametocytes of *P. falciparum*. Of thirty-one examined by the authors, 20 had been treated with quinine, 9 with atebrin alone and 2 with both drugs. On each day of observation and at the same hour the number of leucocytes per cmm. was counted and the number of gametocytes per 100–1,000 leucocytes ; thus were obtained data for estimating the gametocyte content per cmm. of blood. At the same time flagellation of the microgametocytes was observed, by placing the blood smears at a temperature of 26°C. for 15 minutes and then staining with Giemsa.

On each of the subjects 50 anopheles were allowed to feed for 15 minutes by application of a gauze cage (gabbiette di tulle) to the inner surface of the thigh. In this way could be determined whether the gametocyte carriers were still able to infect anopheles, in spite of receiving treatment with quinine and atebrin. After the first application of the anopheles the patients were given 2 cgm. plasmoquine (*i.e.*, from 0·025–0·037 cgm. per kilo body weight). For the first 9 quinoplasmin, 2 tablets (plasmoquine 2 cgm., quinine 60 cgm.) was used ; for the other 23 plasmoquine simplex.

The anopheles, after feeding, were placed in a thermostat at 25°C. in an atmosphere saturated with moisture. Any dying in the early days after the feed were dissected and examined immediately ; the remainder, starting from 5 days after the blood meal, were killed with

chloroform and examined. Throughout the whole experiment 7,873 *A. maculipennis* were used ; 2,300 were allowed to feed before the administration of the plasmoquine and 5,573 in the days following.

The authors were able to show that previous treatment with quinine and atebrin, though having good results as regards the acute stage of infection, had not diminished the infectivity of the gametocytes. Prior to the administration of plasmoquine, of every 100 anopheles examined 32·5 were infected. On the day after the administration of 2 cgm. plasmoquine 951 out of 1,321 anopheles feeding were examined [no reason is given for ignoring the others], 28 were found infected, or 2·9 per cent. ; on the second day after, one only out of 1,089 examined was found infected, and on succeeding days up to the seventh none was found among 2,071 examined.

Also, on the first day after the plasmoquine was given, the number of gametocytes increased, but thereafter they diminished rapidly. Thus, among 31 patients there were, prior to the taking of 2 cgm. plasmoquine, an average of 497 crescents per cmm., on the next day (first day after), 611, on the second 306 (average in 30 patients) on the third 126 (30 patients), on the fourth 14 (10 patients), on the fifth 5 (9 patients), and thereafter none. They found that these small doses of plasmoquine did not kill the microgametes, but seemed to have a sterilizing effect upon them, and in many the microgametocytes became rounded and even after 30–40 minutes' observation had not emitted any flagella.

They state that the duration of the gametocidal effect of this small dose of 2 cgm. lasts for a week [the reviewer cannot find the evidence in the article on which this is based]. This dose, they affirm, is quite innocuous and to obtain successful prophylaxis this dose weekly, or in a zone of severe endemicity twice a week, would suffice. The article contains good tables and graphs. *H. H. S.*

CLEMESHA (W. W.). **Brief Note on the Results obtained with Anti-Gametocyte Treatment Only, without Antilarval Measures.**—*Indian Med. Gaz.* 1933. Apr. Vol. 68. No. 4. pp. 199–202. With 1 chart.

" It is possible to control entirely the spread of malaria by careful anti-gametocyte work."

The author's method was to give two doses of quinoplasmoquine twice a week to every person on the estate. On very malarious estates, this treatment was continued throughout the year ; on the less malarious, it was limited to the malaria season, the search for and cure of gametocyte carriers being undertaken a month before. In those cases where malaria occurred in spite of these measures, the attack was exceptionally mild, and lasted only 2 to 4 days. Tertian and sub-tertian parasites were rare and gametocytes were absent ; quartan trophozoites and gametocytes were more frequent and appeared to be more resistant to the drugs. On one estate with 105 coolies, which was bounded by rivers breeding *A. culicifacies*, the drug was administered by the manager himself, with the result that the labour force was kept entirely free from malaria during a moderately severe outbreak among the surrounding population. On another estate where the coolie lines were situated within a hundred yards of a river and it was quite impossible to do anything in the shape of antilarval measures, regular dosing twice a week was continued throughout the year,

beginning in January 1931. In 1930, there were 80 cases of malaria ; in 1931, there were 29 cases ; in 1932 there were 10. The only parasite that survived was quartan ; in November 1932, 10 per cent. of the children were infected with it, and atebrin is now being tried. Several other examples are given [see this *Bulletin*, Vol. 28, p. 576]. *W. F.*

CLARK (Herbert C.) & KOMP (W. H. W.). **A Second Year's Observation on Malaria in Some Unsanitated Chagres River Villages with Special Reference to the Use of Quinine and Plasmochin.**—Read before the National Malaria Committee, November 18th, 1932, Birmingham, Alabama. 7 pp.

The parasite index was reduced by about 60 per cent. in Panama villages. Quinine was the principal factor in this reduction. Plasmoquine is too expensive for use on plantations and oil-fields in the tropics.

This is a continuation of work done in 1931 (this *Bulletin*. Vol. 29, p. 689) and concerns five villages in the midbasin of the Chagres River in Panama, with a total population of about 1,100. During 1931, quinine for voluntary consumption was provided for all those who had parasites in their blood. During 1932, quinine was continued and, in addition, plasmoquine was given to as many of the inhabitants as could be reached, in doses of 1 centigram twice a week, with the object of rendering the crescents non-infective to *A. albimanus*, the vector. Monthly blood surveys, with thick films, were made throughout the year. " Quinine sulphate powder was placed in the hands of an intelligent woman selected by the people of each village . . . this method . . . was not as effective as could be wished." The authors administered the plasmoquine themselves, at their bi-weekly visits, and left a supply for absentees. " In all, 387 persons took at least 75 per cent. of the treatment, out of a total number of about 680 . . . all received some of the drug at one time or another." The effect upon the parasite rate was as follows : 1930, before treatment 45·6 ; 1931, after 1 year of voluntary quinine, 21·6 ; 1932, after 8 months quinine and plasmoquine, 16·8. " This occurred in the face of a stationary malaria rate in a number of unsanitated areas in other parts of Panama." The authors conclude that the decrease in the malaria rates is due to increased efficiency in the use of quinine, rather than to any other single factor involved. They consider that, in view of the high cost of plasmoquine and the large labour force involved, its use under field conditions is not justified in commercial ventures on the coastal plains, where large numbers of natives are employed. Malaria in a foreign white population can be reduced to negligible proportions, as has been demonstrated in the Canal Zone, but this work is backed by the resources of the United States, at a cost of about 67 cents per head of the inhabitants of the zone. *W. F.*

HANAFIN (P. J.). **Plasmoquine as a Malaria Prophylactic.**—*Jl. Roy. Army Med. Corps.* 1933. June. Vol. 60. No. 6. pp. 422–430. With 3 figs.

A daily dose of 0·02 gram of plasmoquine without quinine, did not prove successful during a three-months' campaign.

Five officers and 35 men left a non-malarious station, lived for 3 nights in a highly malarious area, returned to the non-malarious station and were under observation for several weeks. During the 3 days of exposure and the following 3 days, 18 of these persons received 10 grains

of quinine daily ; the remaining 22 received 0·02 gram plasmoquine. There were 5 cases of malaria in the quinine group, but only 2 in the plasmoquine group. Subsequently, all the troops engaged in suppressing the rebellion in the jungles of Lower Burma, during 1931, were given prophylactic treatment. Half were given 10 grains of quinine daily, and the remainder were given 0·02 gram of plasmoquine. Altogether 5,147 men were dealt with over a period of three months. " Fewer fresh cases occurred amongst the plasmoquine groups, but the number of relapse cases was much higher in these groups than in the quinine groups. . . A dose of 0·02 gram is definitely too small. . . . Toxic effects even in men undergoing most strenuous exertion are far less than hitherto expected." [Cases of subtertian malaria occurring in the group receiving treatment with plasmoquine would be uncontrolled by the drug.] *W. F.*

LABUSCHAGNE (Paul N. H.). **Some Considerations on Atebrin as an Active Anti-Malaria Measure.**—*South African Med. Jl.* 1933. May 27. Vol. 7. No. 10. pp. 332–335.

Estate labourers were treated with atebrin. The results were fairly good.

The author has treated 750 cases of malaria on estates in Natal with atebrin in various doses. The percentage of cures (about 60 per cent.) was " much higher than hitherto experienced with any other drug." The best results were obtained by giving 4 tablets daily for 5 days, and subsequently once a week. By this means the blood was kept free from parasites. " This being the case the proposition seems to boil down to the simple measure of ' atebrinizing ' the whole community without any regard to anti-larval work." *W. F.*

JUNGE (Werner). Prophylaxeversuche mit Atebrin. [**Atebrin Prophylaxis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. June. Vol. 37. No. 6. pp. 294–299.

The author carried out prophylactic observations on 6 volunteers at Bolahun, Liberia, West Africa, where all three forms of malaria are constantly present.

To three of the volunteers he gave daily 0·1 gm. atebrin and to the other three 0·1 gm. atebrin and 0·01 gm. plasmoquine. The investigations were undertaken during the period 1st July to 1st November 1932. It was determined that of 200 natives of Bolahun 72·7 per cent. had malaria and of these 12·7 per cent. were benign tertian, 28·2 quartan and 31·8 malignant tertian. To test the value of this prophylactic measure two of the volunteers, one who had atebrin only and one who had atebrin and plasmoquine, were exposed to the bites of naturally infected mosquitoes after completion of the course. The latter had no symptoms, but the former had moderate headache, pains in limbs and lassitude, but his temperature was always normal. Blood examination showed quartan gametocytes in thick films, but no rings or dividing forms. From his observations the author concludes that atebrin can be taken for several months without toxic effects as a prophylactic against malaria. Plasmoquine is also well tolerated. He considers that the combination is the most suitable method for malaria prophylaxis in countries where malignant tertian malaria frequently occurs. *E. D. W. Greig.*

RUSSELL (Paul F.). **Automatic Distribution of Paris Green for Malaria Control.**—*Jl. Parasitology.* 1933. Mar. Vol. 19. No. 3. pp. 215–224. With 6 figs.

A paralysing lack of money and untrustworthy labour hamper all attempts to control malaria in the tropics. Intelligent laymen have not yet grasped that malaria control must be continued indefinitely, like the repair of roads and the control of water supplies. " All available methods of control should be utilized rather than, as the League of Nations advises, with Europe as a test, that only one or another particular method should be employed in a given place. No single approach to malaria control in the tropics will be more than partially effective. . . . There is no example of effective control in the tropics by measures which did not include an attack on anopheline mosquitoes." Drug prophylaxis, when used alone, is futile and costly. On the other hand there are numerous instances of successful control by anti-mosquito measures : but in most cases these are too costly for general adoption. In an attempt to reduce costs and to dispense with unsatisfactory labour, the author has devised a simple machine which can be fixed over a stream and sprinkles it automatically with Paris green. It consists of a tin hopper of 100 litres capacity which distributes the sand and Paris green mixture at the rate of 180 cc. per minute. It is protected by a small palm-leaf hut. The mixture is 1 per cent. Paris green in sand. Diluents finer than sand cannot be used. The machine can be built for about $25 gold. The Paris green flows out intermittently for about 10 hours. Placed above a shallow stream, two or three yards wide, it caused a pronounced reduction in the numbers of larvae, and the effect was apparent even 300 metres down stream. Other means of automatic distribution are being studied. " Our goal is the construction of a mechanically efficient automatic blower, motivated by the flow of water in the stream under treatment."

W. F.

WALLACE (R. B.). **Paris Green as a Larvicide on an Inland Hilly Estate in Malaya.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. July 28. Vol. 27. No. 2. pp. 131–146. With 4 charts & 6 figs. on 1 plate.

Paris green is of little value as a larvicide in the hilly parts of Malaya, where the stream-breeding *A. maculatus* is the vector of malaria.

The area in which this experiment was made consisted of 10,000 acres of rubber-land situated in the foothills of high ranges ; ravines, streams and drains were numerous and the rainfall was over a hundred inches. The carrier was *A. maculatus*, and most of the breeding places were at the edges of streams, drains and seepages, where there was a distinct flow. Oiling every seven days over a radius of half a mile round all habitations was in force until January 1930 ; from January until October, 1 per cent. Paris green was used instead, in order to reduce costs. The Paris green cost less than the oil, but the breeding places increased in number ; much of the money which was saved by the use of Paris green had to be expended in treating the malaria which followed, and, after 8 months trial, the author reverted to the use of oil. He concluded that Paris green " was not so effective as oil, and was apparently of little value as a larvicide against *A. maculatus*—the

dangerous anopheline of inland hilly areas of Malaya, where the breeding places are almost entirely confined to water moving more or less rapidly." Lime, as a diluent, was too irritating to the eyes and throats of the coolies. Talcum was easy to apply but the results were not good. From May onwards, soapstone was tried, but the results were still unsatisfactory [see this *Bulletin*, QUAIFE, Vol. 27, p. 909. Also MANSON and RAMSAY above, p. 820]. *W. F.*

i. TRAUSMILLER (O.). Ueber die Grenzen der Malaria-Bekämpfung mittels Gambusien. [**Limits of Malaria Prevention by Means of Gambusia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Oct. Vol. 36. No. 10. pp. 530–539. With 4 figs. [19 refs.]

ii. KALANDADSE (L.) & MTSCHEDLIDSE (J.). Materialien zur Biologie des Fisches Gambusia. [**Biology of Gambusia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Oct. Vol. 36. No. 10. pp. 539–544.

i. The author describes the excellent effect, apart from other measures, of the introduction of Gambusia into two malarious islands in the Adriatic.

SELLA'S statement that the use of Gambusia freed a district of Istria from malaria [see this *Bulletin*, Vol. 25, p. 915] was received at the time with scepticism, but Trausmiller has had a similar experience. The islands in question were Krk and Pag which lie close to the Jugo-slavian coast. Krk (26,000 inhabitants) contains masses of limestone in which water disappears so that the people are obliged to store rain water. This they do in primitive pools or cemented cisterns usually below the ground. The cisterns were found to be free from Anopheles, which, however, breed in the pools or "lokwas," made wherever a sufficiency of clay overlies the limestone; of these there are some 400, many of which become dry in summer. In August 1924, 200 Gambusias were brought to the island and in 1926 they were present in most of the lokwas; they have now become thoroughly acclimatized. Every owner of a lokwas has to free the water from vegetation as soon as it is 30 cm. above the surface. In 1926 and 1927 this order was well carried out and larvae were seldom found and though the use of quinine was more and more restricted the malaria curve went down. Whereas in 1925 the spleen index of school children was 7·4 to 19·5 per cent., in 1928 it had fallen in the 19·5 area to 2·3. In 1928 the vegetation was neglected but the expected increase of malaria did not result: the Gambusias were so well established that they had penetrated into the thickest vegetation.

In the island of Pag (10,000 inhabitants) malaria is still more prevalent and some of the ground is swampy; in some places the spleen index is 80 to 90 per cent. To sleep in one village was to contract malaria without fail. But the introduction of Gambusia was just as effective as in Krk, though no attempt was made to keep the pools free from vegetation. That the fish were really the cause was shown by the state of the south end of the island which the author had been obliged to neglect, and where Anopheles larvae were as thick as ever.

ii. Gambusia were in 1925 introduced from Italy to Abkhasian and Ajaristan. The authors have studied their biology and here give an account of it. An interesting point is that they found it paid to open the pregnant female and rear the fry separately, so many did the mother eat even when other food was at hand. *A. G. B.*

HOLLAND (E. A.). **An Experiment in the Control of Malaria in New Ireland by Distribution of** *Gambusia affinis*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 529–538. With 1 map.

The town of Kavieng was freed from mosquitoes by gambusia. The introduction of gambusia into coast villages affected a great improvement, and reduced the spleen rate from 24·6 to 4·2.

New Ireland is one of the islands of the Bismarck Archipelago administered under a mandate by the Commonwealth of Australia. It is over 200 miles long and in places it is less than 5 miles wide. Kavieng, where the author was stationed, is 160 miles by sea from Rabaul, the capital of the Archipelago. The climate is tropical with little variation in the mean temperature. There are two seasons: the South-East, from November to April which is dry; the North-West, from May to October, which is wet. Malaria of the tertian and subtertian types is endemic, quartan is unknown. The only anopheles are *A. punctulatus* Dön. which breeds in clear water, and *A. punctulatus* var. *moluccensis* Swell., which breeds in pig-wallows, slimy swamps and puddles, as well as in clear water. Both are vectors. The population of the district is declining from year to year, and the greatest decline is in the places with the highest spleen rates. The author ascribes this decline to malaria rather than to the "clash of cultures," or "loss of will to survive" spoken of by anthropologists. The author's bungalow at Kavieng was made almost uninhabitable owing to swarms of mosquitoes during his first wet season in 1930. Behind the town there was a swamp which could not be effectively drained because it was approximately at sea-level, and the drains cut from it were themselves excellent breeding places. Oiling was tried, but did not prove effective. In February 1931, about 100 *Gambusia affinis* were received from Rabaul. Half were put in the drains, and half in the ponds outside the town. The drains and ponds became alive with gambusia, and "the town was quickly freed of mosquitoes." Following this success in the town, gambusia was introduced into all known breeding places of anopheles over an area of coastal villages 72 miles long, containing 3,000 natives. The spleen rate fell from 24·6 in August 1930, to 16·8 in February 1931, 12·8 in October 1931, and 4·2 in July 1932. In the control, untreated area, among 3,438 natives, the spleen rate in the corresponding months was 47·1, 23·9, 24·7 and 28·8. There was an excess of births over deaths in the treated areas for the first time on record. "Experiments have shown that gambusia can survive when transferred from pond-water to brackish, and then, to sea-water. There is a possibility, then, that the gambusia going down to sea may distribute themselves over the district by entering rivers and swamps." *W. F.*

ESCALAR (G.). Applicazione sperimentale della zooprofilassi in Ardea. (**Experimental Application of Zooprophylaxis at Ardea (Agro Romano).**)—*Riv. di Malariologia.* 1933. Mar.–Apr. Vol. 12. No. 2. pp. 373–380. With 1 fig. English summary (6 lines) p. 453.

Ardea is a district in the south of Agro Romano, about 4 kilometres from the shore. The permanent residents number some 700, of whom 200 are children up to 10 years of age; there is also a floating population of about 200. The district measures 700 by 300 metres and till 1932 had a high malarial endemicity; in 1930 46·7 per cent. and in 1931

32·26 per cent. A barrage of 20 sties was erected in 1932 (the article has a sketch showing the disposition of these) and the map shows a considerable gap between two of them on the north-east aspect.

Sketch map of Ardea showing ring of pigsties erected in 1932 to attract anophelines from the human habitations.

[Reproduced from the *Rivista di Malariologia*.]

The common anophelines of the district are *A. maculipennis*, var. *messeae*, var. *labranchiae* and var. *basilii*, the second predominating. In May to December 1931, there were 4,791 anopheles caught, of which 3,356 or 70 per cent. were from the dwellings; in the same period of 1932, after the barrage had been established, 24,276 were caught, only 2,368 or 9·7 per cent. in the houses.

During the same period there were 87 and 38 cases of malaria. Throughout the whole 12 months of 1932 there were 63 cases, 33 subtertian and 30 benign, among 704 inhabitants, *i.e.*, 8·9 per cent. in place of 32·2 in 1931 and 46·7 in 1930. The number of primary infections in May-December 1931 was 16; in the same period of the following

year, one. This was in September in a child of 9 months, living at the extreme north-east of the district adjacent to the gap referred to above. It is proposed that other sties should be erected to protect this gap.

H. H. S.

NICKUM (Oliver C.). **Malaria transmitted by Hypodermic Syringe.**—*Jl. Amer. Med. Assoc.* 1933. May 6. Vol. 100. No. 18. pp. 1401–1402.

The author reports a case of benign tertian in a morphia injecter who probably became infected through the agency of a hypodermic syringe which he shared with a man who had formerly suffered from malaria [see BIGGAM, this *Bulletin*, Vol. 27, p. 202]. *W. F.*

AKASHI (Kazuyoshi). **Three Genuine Cases of Malarial Polyneuritis.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1933. Apr. Vol. 32. No. 4 (337). [In Japanese. English summary p. 49.]

Reports 3 cases in which paralytic symptoms resembling acute beriberi appeared either with the onset of an attack of subtertian malaria, or a few days later. *W. F.*

SPAAR (Eric C.). **The Treatment of Malaria in Ceylon with Plasmoquine-Quinine Compounds. A Critical Study of 50 Cases.**—*Jl. Trop. Med. & Hyg.* 1933. June 1. Vol. 36. No. 11. pp. 158–164. With 2 charts.

Twenty-five patients were given 0·03 gm. of plasmoquine and 15 grains of quinine daily, for 7 days or longer. A second series of 25 was given 0·06 gm. of plasmoquine and 12 grains of quinine daily; "toxic phenomena were decidedly noticed in two cases of this series." The author found the first treatment safer than the second and quite as effective.

W. F.

DE MELLO (Froilano), BRÁS DE SÁ (L. J.) & D'AZEVEDO (António). Contribution à l'étude de l'action plasmodicide de l'atébrine. (**Contribution to the Study of the Effect of Atebrin on Plasmodies** [*sic*].)—*Riv. di Malariologia.* 1932. Vol. 11. No. 6. pp. 808–824. English summary p. 940.

The authors give the details of 19 cases treated with atebrin. The results were excellent and confirm those obtained by other workers. They conclude that its action upon the fever is equal, if not superior, to that of quinine. *W. F.*

EPSTEIN (David). **The Action of Plasmoquine on the Uterus.**—*Quarterly Jl. Pharm. & Pharmacol.* 1933. Jan.–Mar. Vol. 6. No. 1. pp. 5–12. With 3 figs.

A fuller version of a paper published in 1931, see this *Bulletin*, Vol. 28, p. 848. *A. G. B.*

D'ALESSANDRIA (Eduardo). La formola leucocitometrica nella malaria tropicale.—*Giorn. Ital. di Malat. Esot. e Trop.* 1933. Aug. 31. Vol. 6. No. 8. pp. 209–212, 215. [17 refs.]

BAKER (J. N.). Malaria Control in Alabama in 1932.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. p. 469.

Basu (B. C.). Report on a Brief Survey of Malaria and Anophelines in Patna.—Records of the Malaria Survey of India. 1933. June. Vol. 3. No. 3. pp. 577–578.

Bishop (E. L.). Malaria Control in Tennessee, July 1, 1931–June 30, 1932.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 472–473.

Browne (W. T.). Malaria Control in Louisiana in 1932.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 471–472.

Cartañá Castellá (P.), Canicio Garcia (I.) & Fabrega Huga (J.). Resumen de la campaña anti-palúdica realizada en el Delta del Ebro desde el año 1925 al 1932, ambos inclusive.—*Rev. San. e Hig. Pública.* 1933. Aug. Vol. 8. No. 8. pp. 113–165. With 1 map, 3 figs. & 7 diagrams.

Clarkson (L. M.). Malaria Control in Georgia by Convict Labor.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 461–464.

Collari (Salvatore). Malaria e tubercolosi. La malarioterapia nella tubercolosi polmonare.—*Lotta c. la Tubercolosi.* 1933. Apr. Vol. 4. No. 4. pp. 360–376. With 7 figs. English summary (9 lines). [22 refs.]

David (J.). Traitement du paludisme par l'atebrine.—*Harefuah.* Jerusalem. 1933. Mar.–Apr. Vol. 7. No. 2. pp. 55–57. [In Hebrew. French summary p. 1.]

Dawson (W. T.). Sources of Remedies for Malaria.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 453–454.

Delacoux des Roseaux. Sur un cas d'intoxication par la quinine.—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 614–616.

Del Campo Cardona (A.) & Pita Gandarias (Eusebio). Nota sobre la lucha antipalúdica en la provincia de Cáceres (años 1921–1932).—*Rev. San. e Hig. Pública.* 1933. June. Vol. 8. No. 6. pp. 553–587. With 8 charts.

Diaz Florez (A.), Garcia de Cosa (C.), Casas (U.) & Ortega (David). Ensayos sobre la acción inmediata del nuevo preparado "Atebrin Bayer" contra el paludismo.—*Rev. San. e Hig. Pública.* 1933. Aug. Vol. 8. No. 8. pp. 182–185.

Ejercito (Antonio). Malaria Studies in the Philippines. Part I. General Considerations Regarding Malaria as a Widespread Disease: Occurrence of Malaria with Other Diseases; Urban Malaria; Rural Malaria; and Malaria as an Important Problem.—*Monthly Bull. Philippine Health Serv.* 1932. Dec. Vol. 12. No. 12. pp. 675–688. [11 refs.]

Fatome. Paludisme et urticaire.—*Arch. Méd. et Pharm. Nav.* 1933. Apr.–May–June. Vol. 123. No. 2. pp. 301–303.

Faust (Ernest Carroll). Malaria Mortality in the Southern United States, 1931.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 454–455.

Fróes (Heitor Praguer). Malaria comatosa. (Comatose Malaria.)—*Riv. di Malariologia.* 1933. Jan.-Feb. Vol. 12. No. 1. pp. 108–114. English summary p. 260.

Galliard (Henri). Remarques sur une étude épidémiologique du paludisme effectuée en Corse, dans la région de Figari.—*Rev. Méd. et Hyg. Trop.* 1933. Mar.–Apr. Vol. 25. No. 2. pp. 100–102.

Garrison (C. W.). Malaria Control in Arkansas in 1932.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 469–470.

Grenierboley (Jean) & Nay-Huoth. Sur le traitement des splénomégalies palustres par l'adrénaline en injections sous-cutanées.—*Rev. Méd. et Hyg. Trop.* 1933. May–June. Vol. 25. No. 3. pp. 157–160.

Hanson (Henry). Malaria Control in Florida in 1932.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. p. 471.

Hegner (Robert). Sir Ronald Ross and the Discovery of the Mosquito Transmission of Malaria.—*Jl. Parasitology.* 1933. June. Vol. 19. No. 4. pp. 312–313.

Henry (A). Les causes d'erreurs dans la pratique de la mélanofloculation.—*Bull. Soc. Path. Exot.* 1933. July 12. Vol. 26. No. 7. pp. 914–919.

John (Hanns) & Glowazky (Franz). Die Wirkung einiger Chinolin-Derivate bei der Vogelmalaria.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 78. No. 3/4. pp. 280–283.

Johnson (W. Scott.) Malaria Control in Missouri in 1932.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. p. 472.

Komp (W. H. W.). Additional Notes on the Preparation and Examination of Thick Blood Films for Malaria Diagnosis.—*Public Health Rep.* 1933. July 28. Vol. 48. No. 30. pp. 875–884.

Lefèbvre. Notes sur le paludisme au 5e territoire militaire du Tonkin.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1933. Mar.–Apr. Vol. 11. No. 2. pp. 151–159. With 1 folding map.

Legendre (F.). Note sur l'état actuel de l'endémicité palustre à Tamatave.—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 875–879.

Legendre (F.). Rapport sur l'état actuel de l'endémie palustre à Fianarantsoa.—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 884–888.

McGinnes (G. Foard). Malaria Control in Virginia in 1932.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. p. 473.

McQueen (W. B.). The Non-Toxicity of Plasmochin and Atebrin.—*Indian Med. Gaz.* 1933. June. Vol. 68. No. 6. p. 323.

Marotta (G.) & Peratoner (U.). L'atebrin nella cura delle febbri di malaria.—*Policlinico.* Sez. Prat. 1933. July 31. Vol. 40. No. 31. pp. 1205–1207. With 3 charts.

Mercier. Notes sur les résultats obtenus dans le traitement du paludisme par l'emploi de la quinoplasmine.—*Ann. de Méd. et de Pharm. Colon.* 1932. Oct.–Nov.–Dec. Vol. 30. No. 4. pp. 635–653.

Mollow (W.). Ueber Atebrin und Atebrin-Plasmochin in der Therapie der Malaria.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. June. Vol. 37. No. 6. pp. 291–294.

Pecori (G.) & Escalar (G.). Relazione sulla campagna antimalarica nell'Agro Romano durante l'anno 1931. (Report of the Antimalarial Campaign in the Agro Romano for 1931.)—*Riv. di Malariologia.* 1932. Sept.–Oct. Vol. 11. No. 5. pp. 615–675. With 1 map, 2 graphs & 12 figs. English summary p. 751.

Peratoner (Ugo). Del metodo di arricchimento nella malaria in rapporto allo studio del parassita. (The Enrichment Method for the Study of the Malarial Parasites.)—*Riv. di Malariologia.* 1932. Sept.–Oct. Vol. 11. No. 5. pp. 676–681. [11 refs.] English summary (3 lines) p. 751.

Pinto (Genserico de Souza). A malaria no sul de Minas Geraes.—*Folha Med.* 1933. Apr. 15. Vol. 14. No. 11. pp. 170–174.

Pott (W. H.). Haematuria—Malarial.—*Chinese Med. Jl.* 1933. Apr. Vol. 47. No. 4. pp. 397–398.

Rector (Nelson H.). Minor Drainage in the Delta Section of Mississippi.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 458–461.

Riley (George E.). Malaria Control in Mississippi in 1932.—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. p. 472.

Ruge (H.). Ueber Uebertragbarkeit der Impfmalaria durch Anopheles. Bemerkungen zu der gleichnamigen Arbeit von Wichels und Maas, Jg. 1933, Nr. 19, S. 744 dieser Wochenschrift.—*Klin. Woch.* 1933. July 15. Vol. 12. No. 28. pp. 1101–1102.

Schwartz (M.). Treatment of Malaria by Plasmoquine and Quinine.—*Brit. Med. Jl.* 1933. June 10. pp. 995–996.

Schwetz (J.). Notes sur le paludisme au Congo. (Notes on Malaria in Congo.)—*Riv. di Malariologia.* 1933. May–June. Vol. 12. No. 3. pp. 540–546. [18 refs.] English summary p. 653.

Schwetz (J.), Baumann (H.), Peel & Droeshaut. Notes malarialogiques sur la répartition de trois espèces malariennes, suivant l'âge, chez les noirs de l'Afrique Centrale.—*Ann. Soc. Belge de Méd. Trop.* 1933. Mar. 31. Vol. 13. No. 1. pp. 49–63. [See this *Bulletin*, Vol. 30, p. 469.]

Sergent (Etienne). Les conditions du paludisme dans la banlieue sud-est de Maison-Carrée (Dt. d'Alger).—*Arch. Inst. Pasteur d'Algérie.* 1933. June. Vol. 11. No. 2. pp. 208–214. With 1 map & 7 figs. on 5 plates.

Sicart (Marcel). Contribution à l'étude de l'atébrine. Dix observations.—*Tunisie Méd.* 1933. Mar. Vol. 27. No. 3. pp. 103–112. With 1 text fig. [41 refs.]

Singh (S. A. S. Jaswant). Some Observations on the Mosquitoes and Sandflies of Rajputana.—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 579–581.

Sinton (J. A.). Rice Cultivation in Spain, with Special Reference to the Conditions in the Delta of the River Ebro.—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 495–506.

Sliwensky (M.). Atebrin-Prophylaxe im Jagdschloss Kritischim in Bulgarien.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Aug. Vol. 37. No. 8. pp. 389–391.

Sur (S. N.), Bhattacharji (K. P.) & Khan (B. M.). Report on a Malaria Survey in Kalimpong and Sikkim.—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 571–575.

Taddia (Leo). Le gambusie nella lotta antimalarica.—*Arch. Ital. Sci. Med. Colon.* 1933. July 1. Vol. 14. No. 7. pp. 422–429. English summary (4 lines).

Tegoni (G.) in collaboration with B. Williams Aureli. Indice bibliografico della malaria.—Supplement to *Riv. di Malariologia.* 1933. Vol. 12. 122 pp.

A Central Malaria Library in Rome.—A malaria library was founded in Rome by the Stazione Sperimentale per la Lotta Antimalarica in 1925, and an index to malarial literature is issued annually by the station. To make the library as complete as possible all malariologists are asked to send books, reports, and articles on malaria to it, and photostat copies of any article in the library may be had for the cost of reproduction. All publications and inquiries should be addressed to the director of the station, Corso Vittorio Emanuele 168, Rome (16).

TYPHUS AND UNCLASSED FEVERS.

NICOLLE (Ch.). Unité ou pluralité des typhus. (Rapport introductif.) [**Unity or Plurality of the Typhus Fevers.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 316–340.

This interesting discussion on typhus fever, epidemic and endemic, was opened by Professor Charles Nicolle who supported the view that the viruses of these diseases were separate and distinct, whereas Professor LÉPINE who followed took the view that they were one and the same.

Professor BRUMPT, who was in the chair, objected to the term "typhus historique" employed by Nicolle as likely further to complicate a complicated nomenclature. Unfortunately Nicolle was unable to be present owing to illness but M. MESNIL replied for him that the term "typhus exanthematique" included epidemic and endemic typhus and Nicolle used "historique" to describe the first and "murin" for the second, *i.e.*, Brill's disease.

Most of the details of Nicolle's thesis have already been published. He relies principally on the difference in the action on guineapigs and rats to distinguish the viruses, also the high mortality in man with epidemic typhus and the difference in action on lice. LÉPINE on the other hand pointed out that although at first the virus of rat typhus produces fever and scrotal reaction in experimental animals, after passage this reaction ceases to appear and later no difference can be noted between the two viruses. As regards the action on lice both LÉPINE and BRUMPT pointed out that Nicolle was relying on WEIGL's method of inoculation *per anum*, which is certainly not a natural mode of infection and if lice are infected by feeding on a patient or on an infected monkey the rapid destruction of the lice does not occur and lice fed on a typhus patient live the same time as those fed on a patient suffering from Brill's disease.

As regards crossed immunity experiments it is interesting to note that both sides claimed results supporting their own view of the case. LÉPINE quoted an interesting series of experiments in which he inoculated a number of guineapigs with typhus virus ; after they had reacted they were inoculated with the virus of endemic typhus with the following result :—

50 per cent. showed no reaction, immune ;
40 per cent. showed a mild attenuated reaction ;
10 per cent. a moderate reaction ;

but none so severe as in the controls. When a similar series of guineapigs were reinoculated with the homologous virus exactly the same result was obtained. Nicolle on the other hand relied on his work (summarized recently) in which he used 3 viruses, Mexican, Tangiers and Toulon, the African virus being true typhus, and claimed that differences in immunizing power were shown.

The other exanthematous fevers such as fièvre boutonneuse, Rocky Mountain fever and Japanese River fever, were briefly referred to but were considered to be sharply separated from true typhus by the differences in the Weil-Felix reaction and the fact that they are carried by ticks and mites and not by lice or fleas. BRUMPT pointed out that recently WEIGL had succeeded in passing the virus of Rocky Mountain spotted fever through several generations of lice and that this passage had in no way altered the action of the virus on guineapigs. LÉPINE

gave details of a recent epidemic of 50 cases of typhus in the city of Drama in which he considered that the first two or three cases were flea-borne and these gave rise to the small epidemic which was louse-borne ; on the other hand Nicolle found that in the mines in Algeria where everyone was subject to the bites of fleas only the men who were infested with lice developed typhus. *D. Harvey.*

Nicolle (Charles). Unité ou pluralité des typhus exanthématiques, (à propos de la discussion de mon rapport à la séance du 9 février). [**Unity or Plurality of Typhus Viruses.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 375–376.

Professor Nicolle was unfortunately unable to be present at the recent discussion on this subject owing to ill health. He now replies to some criticisms of his paper which was read on that occasion.

He maintains that there are many small points of difference between the typhus viruses (endemic and epidemic) but he insisted in his paper on one only of the most importance—that is the difference in action of the viruses on the rat. The virus of epidemic typhus is maintained in the rat with difficulty (3 generations at most), whereas the virus of endemic typhus can be maintained indefinitely in rats and mice ; this virus also is capable of passing through the alimentary mucous membrane of rats, not so the epidemic virus. Nicolle believes that there are several endemic viruses ; hence his use of the plural (typhus murins). *D. H.*

Megaw (John). **A Note on Professor Nicolle's Views on the Typhus and Relapsing Fevers.**—*Indian Med. Gaz.* 1933. Aug. Vol. 68. No. 8. pp. 462–464.

General Megaw refers to a recent paper by Professor Nicolle in which he proposes the names of "historical typhus" and "murine typhus" for epidemic and endemic typhus; Megaw considers that the confusion in the nomenclature of the typhus diseases is not likely to be lessened by Nicolle's proposals, and refers to his own original suggestion to employ the name of the insect vector, where that is known. In view of recent discoveries it is now necessary to add to louse, tick and mite typhus a special group for flea typhus. *D. H.*

Lemaire (G.). Sur la dénomination de "fièvre exanthématique." [**The Name "Fièvre Exanthématique."**]—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 934–935.

The author cites the conclusions of a Commission consisting of Professors Nicolle, Olmer, Jorge, Combiesco, Marcandier and Plazy who recently (October, 1932) decided that the term exanthematous fever should be applied to the group of typhus-like fevers and that "Marseilles fever" should be called fièvre boutonneuse and should be included in the group. Lemaire considers the term *boutonneuse* to be a misnomer as regards the eruption and objects to this fever being included in the group of typhus-like fevers. He contends that "fièvre boutonneuse" can be readily distinguished on clinical grounds from typhus or Brill's disease. [Possibly this may be so but on the other hand it would be difficult to separate a case of fièvre boutonneuse of moderate severity from a similar type of case of tick fever, tropical typhus, Japanese River fever or Rocky Mountain fever on clinical grounds alone.] *D. H.*

JORGE (Ricardo). La famille typho-exanthématique. [**The Typhus Group of Fevers.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. Feb. Vol. 25. No. 2. pp. 289–304. [Refs. in footnotes.]

Dr. Jorge, who first reported the occurrence of fièvre boutonneuse, or as he originally called it " fièvre escharonodulaire," in Portugal, renders a report on the general subject of the typhus group of fevers to the International Office of Public Hygiene in Paris.

The first part is concerned with typhus major and minor, or in other words epidemic and endemic typhus. Dr. Jorge makes the interesting commentary that in the year 1546 the Italian physician FRACASTOR described typhus fever under the term febris peticularis and that in the same century the common name for the disease in Portugal and Spain was " tabardillo " and that both the name and the disease were transported to Mexico by the explorers of that period.

Dr. Jorge then deals at some length with the subject of fièvre boutonneuse, the name which has been recommended for the disease by the Congress recently held in Marseilles. This Congress also proposed that the term exanthematous fevers should be utilized for the group of typhus-like fevers. Dr. Jorge notes that the term eruptive fever is still employed by English writers. *D. H.*

TOOMEY (Noxon). **The Typhus-Spotted Fever Group.**—*Ann. Intern. Med.* 1932. Oct. Vol. 6. No. 4. pp. 542–562.

This paper is a summary of knowledge concerning the typhus group of diseases or typhus-spotted fever group as the author terms it. As he points out, many of the less known fevers of the group which are included under local names in his tables will eventually fall into one or other of the better known categories, louse-borne, tick-borne or flea borne typhus, when they have been investigated on the lines of research followed in the case of endemic typhus in America and " fièvre boutonneuse " in Europe and Africa.

The paper contains two very useful tables, the first being a chronological record of the principal discoveries in this group of diseases from 1902 to 1932 inclusive. The second table places the diseases under the known vectors, with the seasonal variation, incubation period, presence or absence of primary sore, and the chief clinical symptoms so far as these are known. [" Ship typhus " is included under the mite-borne diseases, but the " ship typhus " of Toulon has been definitely shown to be endemic typhus carried by rat fleas. In another place " endemic typhus " is referred to as " spotted fever of eastern type " which is liable to cause confusion.]

The author points out that the comparative symptomatology of the diseases of the typhus-spotted fever group can be correlated in a general way with the vectors implicated. Thus a primary sore at site of inoculation is not observed in louse-borne or flea-borne typhus, is met with in some but not in all of the tick-borne diseases, and is virtually a constant feature in the mite-borne diseases.

Secondary lymphangitis is not met with in louse-borne or flea-borne diseases and is rare in tick-borne disease but practically constant in the mite-borne diseases ; yet even in these last some differences can be noted ; thus in Japanese River fever the local reaction is severe and the lymphangitis slight, whereas in pseudo-typhus of Sumatra the local reaction is slight and the lymphangitis is severe. As regards the rashes met with in these fevers, if a large number of cases of each type is

studied certain broad distinctions can be made out. Thus in the louse-borne and flea-borne type in the Mexican fevers the rash is less papular, is larger and distributed more on the lower part of the body than in the classical typhus of Europe ; in the same way endemic typhus can be distinguished from old world typhus, as the rash is a somewhat smaller lenticular lesion with less tendency to become petechial. In the tick-borne diseases Rocky Mountain fever shows a marked passive congestion and the rash appears first on the wrists and ankles spreading upwards as oedematous macules, usually sparing the face. In " fièvre boutonneuse " the rash is much more papular and appears first on the face or upper parts of the trunk. In the mite-borne diseases the rash is much the same in all.

The bacteriological evidence, such as crossed immunity tests and Weil-Felix reactions, also tends to divide the same main groups, louse- and flea-borne types, tick-borne types, and mite-borne types. *D. H.*

Toomey (Noxon). **A Sporadic Benign Rickettsial Fever with Occasional Exanthem.**—*Ann. Intern. Med.* 1933. Jan. Vol. 6. No. 7, pp. 921–940. With 2 charts. [30 refs.]

An intensely febrile disease of short duration (3 to 4 days fever, intermission for one or two days and a secondary rise on the 6th or 7th day) was observed to cause a sharply localized group of cases in Illinois during early August 1932.

Of the eleven cases described 10 were without rash ; in the other case there developed an ascending macular rash somewhat resembling that of a mild case of Rocky Mountain fever but disappearing suddenly with the lysis of the fever. Although the disease was probably insect-borne a primary sore at site of inoculation was not observed. The vector was not identified but there was a history in two cases suggesting that the virus was transmitted by an hymenopteron of the genus *Halictus* locally known as " sweat bees." Agglutination tests against strains of Proteus X-organisms showed an affinity for the non-indologenic strain XK in addition to slight agglutination of X 19 strains. Guineapigs were moderately susceptible to the virus ; the reaction was without a noticeable scrotal lesion, thus resembling the reaction following inoculation of epidemic typhus rather than that of Rocky Mountain fever or endemic typhus virus. Rickettsia were found in smears made from the tunica of guineapigs during the fever resulting from inoculation of the blood of the cases.

[It is of interest to note that the blood of patients taken on the 9th day of the disease, *i.e.*, 2 or 3 days after the fever had ceased, was infective for guineapigs, also that blood taken on the 20th day from the onset was still virulent.]

Guineapigs which had recovered from fever due to inoculation of patients' blood were found to be susceptible to inoculation with the virus of Rocky Mountain fever but they appeared to have a partial or group immunity to this virus as compared with normal control animals ; they showed no immunity to the virus of endemic typhus. *D. H.*

Dyer (R. E.), Badger (L. F.), Ceder (E. T.) & Workman (W. G.). **Endemic Typhus Fever of the United States : History, Epidemiology and Mode of Transmission.**—*Jl. Amer. Med. Assoc.* 1932. Sept. 3. Vol. 99. No. 10. pp. 795–800. [75 refs.]

This is a very complete review of the literature of endemic typhus of the United States and is prefaced by references to the early work of

Murchison, Carter, Nicolle and Ricketts and others on epidemic typhus. The later papers mentioned have all been reviewed in recent numbers of this *Bulletin.*

"From the foregoing facts, it would appear definitely established that the disease typhus has two manifestations known at present: the first and better known, a louse-borne disease of great communicability from person to person in times of overcrowding of unclean populations and characterized by its tendency to the formation of epidemics; the second, a disease primarily of rodents which is apparently transmitted from rat to man by rat fleas. This manifestation of typhus seemingly is not transmitted from man to man and is therefore characterized by the tendency to remain endemic." *D. H.*

Dyer (R. E.), Workman (W. G.) & Rumreich (A.). **Endemic Typhus Fever Virus recovered from Wild Rat trapped at Typhus Focus in the United States.**—*Public Health Rep.* 1932. Dec. 30. Vol. 47. No. 53. pp. 2370–2372.

Dyer and his co-workers refer to their previous reports of the recovery of the virus of endemic typhus from rats in an endemic area (Savannah). The purpose of the present communication is to set out this work in greater detail by means of tables.

Of 481 guineapigs inoculated in the course of the work 30 died of intercurrent infections and 85 per cent. of the survivors showed the typical scrotal reaction. *D. H.*

Bablet (J.) Résultats des recherches poursuivies sur les fièvres exanthématiques en Indochine depuis 1908. [**Typhus Fevers in Indo-China since 1908.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8. & 9. Vol. 26. No. 2. pp. 340–345. [12 refs.]

Typhus fever (louse borne) was first described in 1908 in Indo-China by Yersin; the rash in natives was either slight or non-existent. In 1921 a small epidemic occurred in the jail in Hanoi, the Weil-Felix reaction being strongly positive. Since 1926 it has been established that there are two if not three types of typhus, one carried by lice and one by fleas, Weil-Felix reaction X19 positive, and a third form in which the serum of the patient agglutinates Proteus XK. Cases of tsutsugamushi fever have also been diagnosed. *D. H.*

Gajdos (Stephen) & Tchang (Joseph). **Researches concerning Typhus in North China.**—*Chinese Med. Jl.* 1933. May. Vol. 47. No. 5. pp. 441–451. [13 refs.]

True louse-borne typhus is very common in N. China, due to overcrowding in insanitary dwellings and heavy infestation with lice. Reliable statistics of the numbers of cases or of deaths in the native community do not exist; but in the case of one of the local missionary societies it has been ascertained that of 112 deaths in the last 20 years 84 were due to typhus.

In 1931 the authors took up the study of the local typhus virus. They obtained a supply of vaccine from Professor Weigl of Lwow and have inoculated 230 of the missionary staff and although these people have been exposed to infection for two typhus seasons none so far has developed typhus. Three doses of the vaccine were given in each case. The authors have isolated the virus in guineapigs (17 strains) and the interesting point is that this virus gives rise to fever and marked

scrotal swelling in guineapigs, that is to say the same reaction as is given by the Mexican typhus virus and differing from that of the Old World typhus virus. Lice were also infected by the anal route with emulsion of guineapig brain and Rickettsia developed in the cells lining the gut and the gut contents were proved to be infective for guineapigs.

D. H.

Marcandier & Pirot (R.). Typhus murin et sodoku chez le cobaye infecté expérimentalement. [**Rat Typhus and Rat-Bite Fever in the Guineapig.**]—*Bull. Soc. Path. Exot* 1933. Jan. 11. Vol. 26. No. 1. pp. 32–46. With 5 charts.

The authors point out that errors may arise in experimental work on typhus due to double infections in wild rats and experimental animals.

In the present paper they show that wild rats may harbour the virus of sodoku or rat bite fever, *Spirillum muris*, as well as the virus of typhus. In guineapigs infected with *S. muris* fever results and also a swelling of the genitals; other symptoms are blepharitis, increased sensitivity of the skin and a double inguinal adenitis. This condition differs from that following injection with typhus virus because the incubation period is longer and the genital swelling appears later; it consists of a thickening of the integument which persists for many days and ultimately leads to atrophy of the testicle; the causal organism, *S. muris*, may be demonstrated in the blood and peritoneal fluid and also in fluid drawn off from the swollen genitals. In all typhus work in which wild rats and guineapigs are employed the possibility of infection with *S. muris* should be kept in mind. *D. H.*

Le Chuiton (F.) & Moureau (M.). De la nécessité d'une observation prolongée pour affirmer le typhus murin. [**The Need for Prolonged Observation before diagnosing Murine Typhus.**]—*C. R. Soc. Biol.* 1933. Apr. 27. Vol. 112. No. 14. pp. 1378–1379.

In some of the guineapigs inoculated with a virus from rats in Bordeaux fever continued irregularly for 2 to 3 months, which is unusual after inoculation with typhus virus.

In the fluid drawn from the swollen scrotum in these animals spirilla were observed, and the authors considered that there was a mixed infection of the endemic typhus virus and the virus of sodoku (*Spirillum morsus muris*). But when these animals were later tested with typhus virus it was found that they were not immune. The conclusion is that the virus isolated from the rats was that of sodoku or rat-bite fever, which produces prolonged irregular fever with testicular reaction in guineapigs and not typhus virus. *D. H.*

Marcandier & Pirot (R.). Acquisitions récentes dans l'étude épidémiologique et expérimentale du typhus murin à Toulon. [**Epidemiological and Experimental Study of Murine Typhus at Toulon.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 349–354.

This paper gives a summary of the history of endemic typhus in the ships of war in Toulon harbour. In 7 years 135 cases have been diagnosed.

Most of the cases occurred in July, August and September but a few in November and December and one or two in January. Infection in

all cases was acquired on board ship, in none among the shore establishments. As many as 64 per cent. of rats were found to be infected on board the cruiser *Paris* at the height of the epidemic on that ship; no infected rats were found on ships in which cases had not occurred. The virus of typhus has been proved by injection into guineapigs to be present in the urine of wild rats. *D. H.*

KODAMA (Makoto). **On the Existence of "Manchurian Fever" in Honshu, Japan. (Confirmation of the Study of Dr. R. Matsubara.)** —*Kitasato Arch. Experim. Med.* 1933. July. Vol. 10. No. 3. pp. 190–195.

Endemic typhus has now been found to occur in Japan. Dr. MATSUBARA of Honshu sent some of the virus (guineapig blood) to the author; he has compared it with the local endemic virus in Manchuria and found them to be identical as regards their action on guineapigs, rats and rabbits. *D. H.*

NICOLLE (Charles) & LAIGRET (Jean). L'épreuve des immunités croisées dans les différents typhus (avec quelques considérations sur le mauvais emploi que l'on fait parfois de cette méthode). [**Crossed Immunity Test in the Different Forms of Typhus. Sources of Error.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 251–270.

The authors report in this paper the results of an elaborate series of experiments on crossed immunity tests with typhus viruses. They point out that errors may arise in such work if the following precautions are not observed and careful preliminary tests carried out.

1. If the test inoculation is given immediately at the end of the fever due to the first inoculation.

2. If the original virus is still present in the test animals ("premunition").

3. If the first inoculation is given at too late a date and immunity may have passed off.

4. If the possible occurrence of inapparent infections is not kept in mind.

In many diseases, among which tubercle, relapsing fever and typhus may be included, the germ of the disease may remain active in the body long after apparent recovery has taken place. Nicolle and others have shown that in the case of endemic typhus the virus can be demonstrated in the brain of rats (60 days) and guineapigs (40 days) after the fever has ceased. SERGENT has described this period as the period of premunition, and Nicolle considered that animals should not be employed for crossed immunity experiments during this period, since, presumably, as long as the germ remains active in the body immunity should be present in the majority of cases for the homologous and closely related viruses; as will be seen later this view proved to be incorrect.

A series of preliminary investigations was carried out to arrive at the optimum time for administration of the test dose and it was found

that from 1 to 3 months after the initial reaction was the time of election. Three strains of virus were employed in the experiments :—

(*a*) Tunis strain of human louse-borne typhus.

(*b*) A strain of endemic typhus virus isolated from rats in Mexico.

(*c*) A strain of endemic typhus virus isolated from rats on a ship in Toulon Harbour.

Details of Experimental Results. Homologous Viruses.—The African human virus protects against itself when tested 3 months after the first reaction (*i.e.*, outside the period of premunition) 3 times out of 4 trials.

The Mexican rat virus showed itself less active against its own virus ; out of 9 test animals (1 to 4 months), 3 became infected. The resistance was greatest at the 1st month. (Premunition ?).

The Toulon rat virus was the most active as a homologous vaccine. 2 infected out of 11 tested.

Crossed Immunity, Heterologous.—The human African virus protected in more than half the cases against the Mexican rat virus, 11 out of 20 tests ; yet 4 times out of 5 in animals tested in the period of premunition it failed to protect when according to theory immunity should have been highest. The human African virus when tested against the Toulon rat virus gave similar results to the above ; again, in 3 cases out of 5 tested in the 1st month there was failure to protect.

The Mexican rat virus gave very solid protection against the human African virus, 9 guineapigs out of 9 protected. The Toulon rat virus gave a similar result against the human virus. The Mexican rat virus against the Toulon rat virus, 8 protected out of 8 tested. But the Toulon rat virus was less active against the Mexican rat virus—4 out of 10 failure to protect.

Reflexions.—Nicolle remarks that possibly too much has been made of the influence of the condition of " premunition " and that, as will be noted, he employed animals in his experiments at the end of one month after the fever when it was probable that the germ was still present in the brain, and a number of these animals were proved to be susceptible ; especially was this the case when heterologous strains were used as test.

The general conclusions are that the tests carried out show that these 3 viruses are closely related and vaccinate the one against the other ; yet as is shown in the detailed list there are distinctions ; thus the rat viruses protect guineapigs against the human virus better than this virus does against itself. Also there is apparently no difference in the results if the animals are inoculated during the period of premunition or later on, say after 3 months. *D. H.*

LAWTON (F. Blois) & MURRAY (Alan). **Endemic Typhus (Brill's Disease).**—*Med. Jl. Australia.* 1933. June 24. 20th Year. Vol. 1. No. 25. pp. 773–774. With 1 fig.

A description of a case of endemic typhus in Melbourne, Victoria.

The patient had recently returned from Sydney, N.S.W., where other cases had occurred and where he probably became infected. The fever was severe, lasting about 18 days with delirium and a maculo-papular rash on the abdomen. Blood culture was sterile and the serum gave a negative reaction with typhoid, paratyphoid and *Br.*

abortus but later the serum agglutinated Proteus X19 in a dilution of 1/320 and the Warsaw strain 1/1,000, whereas there were no agglutinins for XK. *D. H.*

Des Essarts (J. Quérangal) & Prade (J. V.). Un cas de fièvre exanthématique observé à Brest. [**Case of Typhus at Brest.**]—*Arch. Méd. et Pharm. Nav.* 1932. Apr.–May–June. Vol. 122. No. 2. pp. 140–146.

The authors consider this case to be similar to the cases of endemic typhus (Brill's disease) which had occurred in the same ship in Toulon harbour six months previously. The interesting points about this case are :—

(1) There was a small primary ulcer or " tache noire."

(2) A very marked positive Weil-Felix reaction with the " Metz " strain of Proteus X19 1/12,000 dilution. Negative reaction with the Polish strain.

(3) The case developed on board ship 6 months after the last case ; no other cases on ship or on shore at Brest.

The blood of the patient inoculated into guineapigs gave no reaction. Rat fleas were collected on the ship and emulsified and injected into guineapigs but without result. *D. H.*

Nicolle (Ch.) & Laigret (J.). A propos de la bactérie habituée de la tunique vaginale des cobayes et des rats. [**The Organism of the Tunica Vaginalis of Guineapigs and Rats.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 271–272.

The authors refer to their previous communication [this *Bulletin*, Vol. 29, p. 775] in which they showed that if guineapigs are inoculated with an emulsion of the brain of normal animals or with certain inorganic salts small bodies resembling Rickettsia appear in the tunica. They did not suggest that these bodies were Rickettsia or had any relation to the virus of typhus but that the possibility of their appearance should be kept in mind ; otherwise erroneous conclusions might be formed. *D. H.*

Nicolle (Charles), Laigret (J.) & Giroud (P.). Passage des virus des fièvres exanthématiques par la voie digestive chez le rat. [**Passage of Typhus Viruses through the Digestive Tract.**]—*C. R. Acad. Sci.* 1933. Jan. 23. Vol. 196. No. 4. pp. 225–227.

The authors suggest that the virus of typhus may be conveyed from rat to rat when a sick rat is devoured by its neighbours or a rat swallows its own or another's ectoparasites.

Four strains of virus were employed in the present series of experiments :—(1) Rat virus of Toulon. (2) Rat virus of Mexico. (3) Human virus Tunis. (4) Rocky Mountain fever. Rats were fed on the brains of guineapigs infected with virus No. 1 ; four rats were used and all became infected ; with the human virus one rat only out of 5 became infected.

The experiments show that rats may become infected through the digestive tract. *D. H.*

Nicolle (Charles) & Laigret (J.). Extension du pouvoir immunisant des virus exanthématiques par association de deux virus d'origine différente. (Virus typhiques contre virus de la fièvre pourprée.) [**Increase of Immunizing Power by Association of Typhus Viruses of Different Origin.**]—*C. R. Acad. Sci.* 1933. Feb. 27. Vol. 196. No. 9. pp. 587–589.

Lepine has recently pointed out that if an animal is repeatedly inoculated with the virus of typhus and then later tested with allied viruses such as Rocky Mountain fever and fièvre boutonneuse it will not react.

Nicolle inoculated 22 guineapigs once only with typhus virus—all reacted ; later on all were tested with Rocky Mountain fever virus and all reacted but one. However, of 3 monkeys which had each received 2 or 3 doses of typhus viruses of different origin 2 when tested some months later failed to react to Rocky Mountain fever.

Nicolle concludes that it is possible to protect animals by means of repeated doses of typhus viruses of different origin against closely allied viruses such as that of Rocky Mountain fever. *D. H.*

Nicolle (Charles). Entretien du virus typhique historique (souche tunisienne) par passages de plèvre à plèvre, chez le cobaye. [**Maintenance of Historic Typhus Virus by Pleural Passage in Guineapigs.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 398–400.

The usual methods employed for carrying the typhus virus from guineapig to guineapig is by inoculation of emulsion of brain or of exudation from the swollen scrotum. The authors have used pleural fluid and have found that it gives as good results. *D. H.*

Nicolle (Charles). Entretien du virus typhique historique (souche tunisienne) par passages sur rats. [**Maintenance of Historic Typhus Virus by Rat Passage.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 349–356.

In this series of experiments one guineapig and two white rats were inoculated on each occasion. As Professor Nicolle originally noted, the virus of epidemic typhus (European) produces only an inapparent infection in rats ; therefore a guineapig was inoculated for each pair of rats as an " indicator." One of the rats was killed to passage the virus, the other retained to be tested later for its presence. It was found that the brains of the rats might be infective both before and after the period of the fever in the guineapigs, from 4 days before to 2 days after. In this series of experiments the infection died out at the 13th passage. As the fever in the " indicator " guineapigs became less and less at the later passages, Nicolle considers that the virus had died out because the rat has resistance to the virus which therefore becomes weakened and not because the virus happened to be absent from the rat's brain at the time it was killed. The virus of epidemic typhus can be passaged practically indefinitely in guineapigs just as the virus of endemic typhus can be passaged in rats, this constituting a major differential point between these viruses as regards their action on experimental animals and on wild rats in nature. *D. H.*

NICOLLE (Charles) & LAIGRET (J.). Conservation des divers virus typhiques dans le cerveau des rats et cobayes infectés. [**Preservation of Typhus Viruses in Brains of Rats and Guineapigs.**]—*C. R. Acad. Sci.* 1933. Mar. 13. Vol. 196. No. 11. pp. 733–735.

A note by Professor Nicolle of some experimental work to show the different action on experimental animals of the viruses of epidemic (historique) and endemic (murin) typhus.

1. The virus of endemic typhus is still present and active in the brains of rats 60 days after the fever produced by the intraperitoneal injection of infected brain, whereas in guineapigs similarly inoculated the virus disappears by the 30th day.

2. The virus of epidemic typhus was tested by similar injection of a series of animals but these animals, rats and guineapigs, were killed at intervals from the 4th day after inoculation up to the 24th day (fever in controls from 7th to 15th day). Tests showed that in the guineapig brains the virus was present in much greater content than in the brains of the rats, the opposite of the result with the endemic virus. *D. H.*

NICOLLE (Charles) & LAIGRET (J.). Conservation des virus typhiques dans le cerveau des rats et des cobayes inoculés avec ces virus. [**Conservation of the Typhus Viruses in the Brains of Rats and Guineapigs.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 357–380.

In this series of experiments a number of rats were inoculated and at the same time a similar number of guineapigs to act as "indicators."

In view of the fact that the virus of endemic typhus occurs naturally in the rat and produces a severe reaction the authors considered that the period of infectivity in the rat would be greater than after the infection produced by the epidemic virus.

Three rat typhus viruses were utilized in this work, one from Toulon and two from Mexico. The rats were killed at varying dates after inoculation and 1/10 of the emulsion of brain inoculated into a guineapig. Two dates are given, or rather numbers of days, the first being the number of days after the inoculation of the rat, the second the number of days after fever had ceased in the companion or "indicator" guineapig. Thus with the Toulon virus the two dates are 68 days and 60 days, that is the longest time after inoculation that the virus could be isolated from the brain of the rat was 68 days and after the fall of the fever in the guineapig 60 days. For guineapigs the figures were 32 days and 10 days. In rats infected with the Mexican virus this could be isolated 50 days after inoculation and 30 days after the cessation of fever in the guineapig, and 34 days and 20 days for guineapigs. That is to say that the virus remained viable in the rat much longer than in the guineapig; the converse, as has been shown, occurs with the epidemic virus (European). [See previous paper.]

The historic virus (Tunis) was found to be viable in the brain of the rats from the 7th to the 16th day after inoculation and 4 days before the appearance of fever in the "indicator" guineapig till 2 days after the fall of the fever, *i.e.*, 16 days and 2 days as compared with 68 days and 60 days with the endemic virus. On the other hand the virus was viable in guineapigs up to the 20th day.

A second series of 24 rats was employed to confirm these results with the European virus but the virus was still viable on the 24th day when the last of the rats was killed.

A few experiments were also carried out on the same lines with the virus of Rocky Mountain spotted fever and apparently this virus disappears from the brains of rats before the 20th day after inoculation.

Thus, as was forecasted, the virus of endemic typhus remains viable in the brain of the rat for a much longer period than does the virus of European epidemic typhus ; also the virus of endemic typhus is viable in the brain of the rats for a longer period than in the brain of the guineapig, the reverse being the case with the epidemic virus. *D. H.*

Nicolle (Charles), Laigret (J.) & Giroud (P.). Transmission du typhus murin par piqûres et ingestion de puces infectées. [**Transmission of Rat Virus by Bites and by Ingestion of Infected Fleas.**]—*C. R. Acad. Sci.* 1933. July 31. Vol. 197. No. 5. pp. 377–378.

Nicolle fed 160 rat fleas (*X. cheopis*) on an infected guineapig ; and afterwards placed them on a monkey on which they fed for several days ; the monkey became infected. Seventy living fleas were collected from the monkey and killed with chloroform, half the number were emulsified and inoculated into guineapigs and half were rolled up in bread and fed to rats ; these animals also became infected. It is to be noted that none of the animals in these experiments developed fever (inapparent infections) ; proof of infection consisted in inoculation of blood into guineapigs which in turn did not develop fever but were later proved to be immune to endemic typhus virus. *D. H.*

Lépine (P.). Sur la conservation des typhus exanthématiques chez le rat et la souris. [**Conservation of Typhus Viruses in Rat and Mouse.**]—*C. R. Soc. Biol.* 1932. June 17. Vol. 110. No. 21. pp. 442–444.

The author has found that if large doses of the virus of endemic typhus are injected into rats a very severe and often fatal reaction follows ; up to 70 per cent. of the animals may succumb ; smaller doses of the virus produce a febrile reaction and recovery. On the other hand injection of doses of the virus of true epidemic typhus into rats produces only an inapparent infection but the virus may survive for considerable periods in the inoculated animals, up to 94 days.

The author has found that in one at least of the strains of endemic typhus virus (strain A) passage through the guineapig causes it to lose its power of producing oedema of the scrotum in these animals and also its virulence for rats is diminished. It thus comes to resemble closely in its action the virus of epidemic typhus. *D. H.*

Laigret (J.) & Jadin (J.). Sensibilité de la souris blanche aux virus typhiques—passages conservation du virus dans le cerveau des souris. [**Susceptibility of the White Mouse to the Typhus Viruses.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 381–397.

The authors carried out a similar series of experiments to those described in the previous papers with Professor Nicolle, but white mice were employed instead of rats.

The epidemic virus produces an inapparent infection in white mice just as it does in rats. The authors succeeded in passaging the virus of Mexican typhus (rat virus) 16 times through mice although in the later passages the indicator guineapigs showed no fever, an indication of loss of virulence in the virus. Passage was not attempted beyond the 16th generation. The epidemic virus (Tunis) could not be carried beyond the 2nd generation. The endemic or rat virus was viable in the brains of white mice up to the 40th day after inoculation whereas with the epidemic virus no inoculations were successful after the 10th day. *D. H.*

FELIX (A.). **Serological Types of Typhus Virus and Corresponding Types of** *Proteus.—Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. July 28. Vol. 27. No. 2. pp. 147–172. [83 refs.]

In previous papers (1931) the author has put forward the thesis that, in a general way, the viruses of various typhus-like diseases correspond to various types of Proteus. For instance X19 for epidemic and endemic typhus, XK for scrub typhus and for Japanese River fever; and further that the serum reactions with Proteus X types reflect the relationship as revealed with regard to cross immunity, as is evidenced with the diseases cited above; the epidemic virus protecting against the endemic but not against the heterologous virus of Japanese River fever.

Considerable attention has been directed recently to a malignant type of typhus occurring in S. Paulo, Brazil, and shown by PIZA and MONTEIRO to be carried by a tick. Sera from cases of this type of disease contain agglutinins for X19 in high titre, but Dr. Felix has found that in addition these sera also contain group agglutinins for XK which is not the case with the sera of patients suffering from true typhus or endemic typhus.

In 1929 Dr. LIMA of S. Paulo isolated from the faeces of a healthy child a strain of Proteus which was similar culturally and serologically to X19. (This child had a history of having suffered from a typhus-like disease 3 years previously.) This local strain was sent to Dr. Felix and he finds that when this strain of Proteus is inoculated into rabbits the serum develops agglutinins for X19 but also group agglutinins for XK, that is, exactly similar to the sera of patients suffering from the S. Paulo fever. Dr. Felix is of the opinion that this strain of Proteus is the local serological type of Proteus strain of S. Paulo associated with the local typhus virus. A true Proteus X19 when inoculated into rabbits does not produce group agglutinins for XK nor, as already said, does the sera of patients suffering from true typhus contain such group agglutinins. Dr. Felix designates this new strain of Proteus XL (Lima). In addition to producing group agglutinins for XK in rabbit sera, XL also produces some group agglutinins for X2, one of the original Proteus X strains. It is also interesting to note that the sera of patients suffering from or convalescent from S. Paulo typhus agglutinate Proteus X19 in higher dilution than they do Proteus XL (Lima). All these agglutinations refer to the O variety of the strains; the H agglutinins are common to X19, X2, XL and HK.

Another local strain, that associated with scrub typhus in Malaya, has also been studied by Dr Felix, but the curious thing about this strain is that although the O agglutinins of this XM strain correspond to XK, the H agglutinins are not similar.

Dr. Felix considers that if similar local strains of Proteus could be discovered for Rocky Mountain fever, fièvre boutonneuse, African tick fever, Indian tick fever, they would be of great importance in serological diagnosis as well as in further study of this group of viruses. At present the serum of cases of these diseases only shows group agglutination for known strains of Proteus characterized by low titre, late appearance, irregular reaction (occasionally negative). [In view of the fact recently reported that the virus of Rocky Mountain fever protects from the virus of S. Paulo fever it would be interesting to study the agglutination of OXL with the sera of Rocky Mountain fever patients.]

Main and Group Agglutinins in Different Varieties of Typhus.

Name of Disease.	Locality.	Vector.	Agglutination with *Proteus* X Types.			Type of Main Antigen of Virus.
			OX19	OX2	OXK	
Classical typhus ...	Old and New Worlds	Lice ...	+++	+	–	OX19
Tabardillo	Mexico ...	Lice and rat fleas	+++	?	–	OX19
Endemic typhus (Brill's disease)	South Eastern United States	Rat fleas	+++	?	–	OX19
Fièvre nautique ...	Toulon (Warships)	Rat fleas	+++	?	–	OX19
Endemic typhus ...	Australia ...	Unknown	+++	+	–	OX19
Tropical typhus, type W (Shop typhus)	Malaya & Dutch East Indies	,,	+++	+ ?	–	OX19
Tropical typhus, type K (scrub typhus)	,,	,,	–	–	+++	OXK
Tsutsugamushi ...	Sumatra and Malaya	Mites	–	–	+++	OXK
,, ...	Japan	,,	–	–	+++ (?)	OXK (?)
Rocky Mountain spotted fever	Western & Eastern United States	Ticks	+	+	+	Unknown
"Fièvre boutonneuse"	Marseilles, Tunis	,,	+	+	–	,,
"Fièvre boutonneuse" (Febbre eruttiva)	Italy	,,	+	+	+	,,
Tick-bite fever ...	South Africa ...	,,	+	+	+	,,
Tick-typhus ...	British India ...	,,	?	?	?	,,
São Paulo endemic typhus	Brazil ...	,,	+++	+	+	OX19

+++=main agglutination. +=group agglutination. ?=not tested adequately.

Twenty-two sera of cases of fièvre boutonneuse were recently tested by Dr. Felix against his stock strains and by his routine method ; 5 of these sera gave negative reactions, the remainder agglutinated X19 in low dilutions and also X2, but did not agglutinate XK at all. The highest titre obtained was 1/2,000 as compared with a titre of 1/20,000 for the sera of typhus patients. An interesting point was that certain of the sera showed a titre of 1/2,000 for X19 and nil for X2, other sera agglutinated X2 at 1/2,000 and nil for X19, obviously, as Dr. Felix says, a group reaction. A table is given showing the serological reactions so far as at present known and divided up as has not been previously done into " main " and " group " reactions. The suggestion is made that the serological reactions so far as " main " agglutinins are concerned agree with the mode of transmission, but it will be noted that the group which has X 19 for its main agglutinin includes louse-borne, flea-borne, and tick-borne diseases.

Dr. Felix insists, and rightly, that serological methods are necessary for the elucidation of this complicated group of diseases and that if such work is undertaken it should be carried out along definite lines and utilizing similar methods. For this purpose he outlines the methods that are employed by himself and his co-workers.

First of all agglutinations should be carried out with the O type of Proteus and care must be taken to keep these O types free from the H variant. A curious thing is that although pure O types retain a steady titre of agglutination with typhus sera the presence of H variants in the suspension causes a fall in this titre. This reversion from O to H may take place in culture and therefore stock cultures must be checked from time to time by plating out on dry agar and rejecting the spreading colonies and picking out O colonies and subculturing these on to dry agar slopes. Suspensions may also be checked by agglutination tests with specific high titre rabbit sera. OX2 is less prone to H reversion than is OX19 but OXK is most prone of the three strains.

Dr. Felix has always preferred to use living suspensions for his agglutination tests but recently the Oxford Standard Laboratory have produced a formalinized suspension which he has found to give excellent results and which he recommends for use when living suspensions are not obtainable, or are liable to revert.

In order that local strains of Proteus may be obtained Dr. Felix gives some account of the methods he and others employed in the isolation of strains of Proteus from the blood and organs of typhus cases.

Isolation from blood.—10 cc. of blood is taken in the first few days of fever into each of 5 or 6 small tubes, the blood is allowed to coagulate and the serum poured off till the clot is as free as possible from serum ; some of the tubes are put in the incubator at 37°C., others in the dark room at room temperature. Loopfuls of blood are taken daily from the centre of the clots and inoculated into serum broth and on to serum agar ; this process is continued for 10 days and then broth is poured into the tubes containing the blood clot and they are incubated and subcultures taken for several weeks.

Urine.—Urine is collected in sterile tubes, centrifuged, and the sediment washed and loopfuls of this are inoculated into serum broth tubes, and into serum agar and incubated.

Organs.—Small portions of organs obtained post mortem are placed in sterile tubes and loopfuls of these removed from day to day and inoculated into serum broth tubes and incubated.

Strains of Proteus vulgaris can be readily isolated from discharge from suppurating ears and from pus from other sources but so far none of these strains has shown any serological affinity for typhus sera so far as O agglutinins are concerned. *D. H.*

ZINSSER (Hans) & CASTANEDA (M. Ruiz). **Studies on Typhus Fever. X. Further Experiments on Active Immunization against Typhus Fever with Killed Rickettsia. XI. A Report on the Properties of the Serum of a Horse Immunized with Killed Formalinized Rickettsia.**—*Jl. Experim. Med.* 1933. Mar. 1. Vol. 57. No. 3. pp. 381–390; 391–398. With 4 charts.

Zinsser and Castaneda report further experiments on animals with their formalinized Rickettsia vaccine prepared from the serous fluid taken from irradiated rats which have been intraperitoneally inoculated with typhus virus (*ante*, p. 400).

About 15 cc. of a suspension of washed Rickettsia, almost comparable to typhoid vaccine in numbers of organisms, can be obtained from a single rat. The experiments recorded clearly show that active immunization of laboratory animals against the Mexican and endemic American typhus virus can be carried out with formalinized and washed vaccines prepared by the X-ray rat method described by the authors. This vaccine is being put to the test as a prophylactic in man by VARELA and others in Mexico.

A horse was immunized by repeated subcutaneous injections of the killed Rickettsia vaccine described in the previous article. The serum of this animal developed agglutinins for Proteus X19 in a dilution of 1–320. The serum also agglutinated the Weigl vaccine prepared from lice infected with the virus of European typhus. An interesting point noted was that this immune horse serum failed to protect against the European typhus virus but developed distinct protective action against the Mexican virus, whether mixed with the virus before injection, administered 1 week before the virus, or given 24, 48 or 72 hours after infection. *D. H.*

VARELA (Gerardo), PARADA (Angel) & RAMOS (Virgilio). **Active Immunization against Tunisian Typhus Fever with Mexican Typhus Vaccine.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Nov. Vol. 30. No. 2. pp. 206–209.

Method of preparation of the vaccine.—Irradiated rats were inoculated intraperitoneally with an emulsion of the tunica of a typhus infected guineapig. Five days later the rats were killed and an emulsion of Rickettsia made in the peritoneal washings; repeated centrifuging and washing gives a protein free emulsion, which is standardized to give approximately 1,000 million Rickettsia per cc. in 0·2 per cent. formolized saline solution. Guineapigs were inoculated with 3 doses of this vaccine; all the controls reacted to test doses but 5 out of 10 inoculated guineapigs did not react. *D. H.*

KEMP (Hardy A.). **Typhus Fever: Some Notes on the Cultivation of the Virus and on Active Immunity.**—*Amer. Jl. Trop. Med.* 1933. Mar. Vol. 13. No. 2. pp. 191–200. [21 refs.]

The author comments on the failure so far to cultivate the virus of typhus on or in any culture medium which does not contain tissue

cells. He utilized a dextrose cystine agar medium which has been successfully used in the study of tularaemia. The blood of 10 cases of typhus was inoculated into 20 cc. tubes of this medium. Gram positive diphtheroids were isolated in pure culture from 6 of the cases. These cultures were inoculated into guineapigs but produced neither scrotal swelling nor typhus lesions in the brain and animals which were tested later were not immune to typhus virus. Kendall's (K) medium was also tested with 5 cases of typhus ; 2 cases showed diphtheroids but these produced no typhus symptoms in guineapigs. There was no evidence of a filter passer stage in any of the cultures. Cultivation of a laboratory strain of Proteus on the K medium produced no change and gave no typhus reaction in guineapigs. *D. H.*

Brumpt (E.). Réactions oculaires chez des lapins inoculés dans la chambre antérieure avec des virus de diverses fièvres exanthématiques. [**Ocular Reactions in Rabbits inoculated in the Anterior Chamber with Various Exanthematous Viruses.**]—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1202–1204.

Brumpt refers to the use of intra-ocular inoculation as used in bacteriology and to the recent work of Nagayo and others on Japanese River fever [see this *Bulletin*, Vol. 29, p. 25]. The virus employed in the present research was obtained from infected lice (typhus) and from infected ticks (Rocky Mountain fever and fièvre boutonneuse).

In the typhus experiment all of six inoculated rabbits showed a positive reaction with iritis and keratitis of long duration ; in one instance opacity of the cornea lasted for 89 days with increase of the size of the eyeball : there was no general reaction (fever).

In the Rocky Mountain fever experiments all of four rabbits reacted with iritis and keratitis but the reaction was less severe and there was no enlargement of the eyeball. Two rabbits which had previously reacted to typhus virus in one eye and recovered reacted anew to the Rocky Mountain fever virus inoculated into the other eye. With the virus of fièvre boutonneuse obtained from the blood of a typical case and inoculated into the eyeball of a rabbit no reaction resulted but with the virus obtained from infected ticks there was a slight reaction.

D. H.

Kodama (M.) & Kono (M.). **Studies on Experimental Transmission of Virus of " Eruptive Fever " and " Typhus " by Several Blood Sucking Insects.**—*Kitasato Arch. Experim. Med.* 1933. Apr. Vol. 10. No. 2. pp. 99–112. [20 refs.]

The title of this paper is misleading ; by " eruptive fever " the authors mean endemic typhus (Brill's disease). In previous papers, already reviewed, the authors have shown that there are two types of typhus in Manchuria—epidemic typhus carried from man to man by the body louse and endemic typhus carried from rat to man by the rat flea ; similar findings had already been made in America and in Europe.

In the present paper experiments were carried out with the endemic virus with various insects including body lice, the human, dog, cat and rat fleas, bed bugs and lice from monkeys, guineapigs and rats. The authors succeeded in transmitting the virus to experimental animals by body lice (human), human fleas, and cat and rat fleas and rat mites ;

but they consider that so far as man is concerned the principal vector is the rat flea, *Xenopsylla cheopis*. They think that the endemic virus becomes changed into the epidemic by repeated passage through louse and man. [This suggestion has already been made but so far has not been generally accepted.] *D. H.*

Kodama (Makoto) & Takahashi (Kensaburo). **Different Points of the Scrotal Reaction of Male Guineapigs Infected with "Eruptive Fever" and "Typhus."**—*Kitasato Arch. Experim. Med.* 1933. Apr. Vol. 10. No. 2. pp. 113–119.

Scrotal reaction is practically constant in guineapigs inoculated with the virus of endemic typhus but only occurs occasionally in animals inoculated with the epidemic virus. If the endemic virus is transmitted through lice the scrotal reaction is not produced in guineapigs at first but appears again when passaged.

The authors describe certain differences in the reaction when produced by the endemic virus or by the epidemic. The difference would appear to be rather one of degree than of kind. The reaction with the endemic virus is severe but with the epidemic it is slight and temporary. Adhesions are firm and strong with the endemic virus but slight and easily separated with the epidemic virus. The exudation in the endemic reaction is thick yellow and abundant and contains numerous polymorphonuclear cells and few lymphocytes and numerous cells containing Rickettsia, whereas the exudation in the epidemic reaction is thin, white in colour and contains mostly lymphocytes with only a few Rickettsia-containing cells. *D. H.*

Marcandier (A.) & Pirot (R.). Fréquence du virus du typhus endémique (typhus murin) dans l'encéphale des rats des navires de guerre à Toulon. [**Frequency of Virus of Endemic Typhus in Brains of Rats of Warships at Toulon.**]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 673–677.

During December 1931 and January 1932 there was a small outbreak of endemic typhus on the cruiser "Paris" in Toulon harbour: there were no cases on any of the other ships of the squadron or among the shore establishments. 104 rats were caught on the ships and on shore and the brains emulsified and injected into guineapigs. From 19 of these rats caught on shore no reaction was obtained. From 39 rats caught on the other ships on the squadron no reaction. But of 46 rats caught on the cruiser "Paris" approximately 25 per cent. were proved to be infective by means of reaction in the inoculated guineapigs.

D. H.

Bruynoghe (R.) & Jadin (J.). La présence du virus du typhus exanthématique dans le cerveau de rats du port d'Anvers [**Typhus Virus in the Brains of Antwerp Rats.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 20. pp. 399–400.

The authors examined rats captured on board a steamer in the port of Antwerp recently arrived from Alexandria and North African ports. Emulsion of brains of these rats when inoculated into guineapigs produced a febrile reaction with swelling of the testicles. The virus was passed through a series of guineapigs and numerous Rickettsia were

found in smears made from the tunica. In white rats the virus produced a febrile reaction and a positive Weil-Felix reaction in the serum. *D. H.*

Bruynoghe (R.) & Jadin (J.). Le virus du typhus exanthématique. [**Typhus Virus.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 28. pp. 1522–1523.

In a previous communication (above) the authors signalized the recovery of the virus of endemic typhus from rats captured on board ship in Antwerp. They have now been able to compare the local virus with a virus obtained from Professor Nicolle (Mexican rat virus) and find that cross immunity experiments were positive. The authors employing an emulsion of tunica of infected guineapigs rich in Rickettsia found that filtration in no way reduced the virulence of the inoculum although, presumably, the majority of the Rickettsia were retained by the filter. Local rodents such as the dwarf mouse (*M. minutus*) were found to be susceptible and many died of the infection. *D. H.*

Blanc (Georges), Noury (M.), Baltazard (M.) & Fischer (M.). Sur la présence, dans l'encéphale des rats de Casablanca, d'un virus ayant les caractères du " typhus murin." [**Typhus Virus in the Brains of Rats of Casablanca.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 18. pp. 132–133.

From 200 rats captured in Casablanca, Morocco, 3 strains of virus were obtained by inoculation of emulsions of the brains into guineapigs.

The first strain was obtained on 10th January 1933, when a mixed emulsion of the brains of 8 rats was employed—4 *M. norvegicus*, 2 *M. alexandrinus*, 2 *R. rattus*. The injection of an emulsion of 11 *M. norvegicus* was successful and also later an emulsion of the brains of 4 *M. norvegicus* and 1 *R. rattus*. The usual reaction of fever with testicular swelling was recorded in all the guineapigs. Infection with the spirillum of " sodoku " was carefully excluded.

The 3 viruses have been passaged in guineapigs to the 17th passage. Crossed immunity experiments with a virus of endemic typhus obtained from Toulon were positive. *D. H.*

Workman (W. G.). **Typhus Fever. Experimental Transmission of Endemic Typhus Fever of the United States by** *Xenopsylla astia.*—*Public Health Rep.* 1933. July 7. Vol. 48. No. 27. pp. 795–797.

Transmission of the virus of endemic typhus from an infected to a non-infected white rat was accomplished by *X. astia*. Crushed infected fleas rubbed upon the abraded skin produced endemic typhus in guineapigs. Faeces collected from infected fleas were shown to contain the virus of endemic typhus. *D. H.*

Jelin (W.) & Grossmann (J.). Ueber experimentellen Fleck-typhus bei Zieselmäusen. [**Experimental Typhus in Ground Squirrels.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 346–355. With 10 figs.

The virus employed in this research was typhus virus (epidemic) which had been passaged in guineapigs. Thirty five ground-squirrels

were inoculated and proved to be susceptible. They reacted with fever and their blood and tissues were infective for guineapigs. Typhus nodules were found in their brains. *D. H.*

COMBIESCO (D.), BONCIU (C.), STAMATESCO (S.) & COMBIESCO (N.). Sur la sensibilité du spermophile au typhus exanthématique épidémique. [**Susceptibility of the Spermophile to Epidemic Typhus Virus.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 21. pp. 499–500.

The spermophile which has already been shown to be susceptible to the virus of "boutonneuse" fever is also susceptible to typhus virus. These animals develop fever lasting 6 days after an incubation period of 4 days. The brain of one animal killed 30 days after inoculation proved to be virulent. The virus can be passed in series from one spermophile to another. *D. H.*

COMBIESCO (D.) & ANGELESCO (J.). Recherches expérimentales sur le typhus exanthématique chez le chien. [**Experimental Typhus in the Dog.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 21. pp. 497–498.

Two puppies were inoculated intracerebrally and intraperitoneally each with half the emulsion of the brain of a guineapig, killed during fever following inoculation of epidemic typhus virus (Poland strain). Neither showed any reaction. One dog was killed on the 14th day and an emulsion of the brain inoculated into two guineapigs; both reacted after an incubation period of 7 days with fever lasting nine days. The virus was passaged from these guineapigs. The other dog was killed on the 26th day after inoculation and emulsion of its brain also proved infective for guineapigs. Another puppy was inoculated with the virus (guineapig brain) of endemic typhus (Mexico); this animal did not develop fever but its brain proved to be infective for guineapigs. *D. H.*

DURAND (Paul). Etude expérimentale de quelques virus exanthématiques chez le chien. [**Study of Typhus Viruses in the Dog.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3 pp. 484–503. With 7 graphs.

It has already been shown by the author that dogs are susceptible to the virus of "fièvre boutonneuse" if young puppies, which have not been exposed to tick bite, or dogs from areas of countries where the disease does not exist are selected. Although the disease in such animals is without any clinical manifestation, the infection can be demonstrated by inoculation of the blood or organs into susceptible animals and by the fact that a positive Weil-Felix reaction appears in the serum of the infected dog. So far dogs have not been proved to be susceptible to infection with any of the other typhus viruses. For the present research stray dogs were collected in Tunis and any who showed a positive Weil-Felix reaction greater than 1/50 were rejected.

The viruses employed in this research were :—3 strains of European epidemic typhus : 1 strain of typhus from Mexico ; 1 strain of typhus from Toulon ; 1 strain of the virus of Rocky Mountain spotted fever. These viruses were inoculated by various routes and in variable doses;

none of the animals reacted clinically in any way; all developed a positive Weil-Felix reaction in the serum. The reaction was tested before inoculation and once or twice a week thereafter for six weeks. The results are displayed in graphic form by means of charts; the strains of Proteus employed were X19 and X2. It was found that many of the sera agglutinated XK before inoculation, and as there was no subsequent rise of titre for this strain the charts only show the results with X19 and X2. The maximum point of the reaction was usually noted between the 10th and 15th day after inoculation and the titre returned to its original level after about six weeks. Practically all the sera gave a positive reaction in a dilution of 1/100, many reached 1/200 and the highest rise noted was 1/400. The strain X19 gave the better results, although agglutinins for X2 were produced in the majority and in two cases in higher titre than for X19.

It was not possible to note any difference in the reaction according to the virus employed nor apparently had the route of inoculation or the amount of the dose any influence. Some of the dogs were killed during the infective period and blood or organs inoculated into guineapigs, with positive results in the case of the typhus viruses (epidemic and endemic) but not with the Rocky Mountain fever virus. *D. H.*

i. Tzechnowitzer (M.), Moldavskaya-Kritchevskaya (V.), Gorchowa (E.) & Fridman (G.). Réaction de mélano-floculation de Henry et typhus exanthématique. [**Henry's Reaction and Typhus.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 26. pp. 1093–1094. With 1 fig.

ii. Karout (T.) & Moldavskaya-Kritchevskaya (V.). Réaction de mélano-floculation de Henry et typhus exanthématique expérimental du lapin.—*Ibid.* pp. 1094–1095. With 1 fig.

i. The authors carried out the pigment flocculation tests as employed in malarial cases in 100 cases of typhus. In 95 the reaction became positive during the course of the fever, following closely the curve of the Weil-Felix reaction.

ii. Six rabbits inoculated with typhus virus developed a positive Weil-Felix reaction and at the same time the pigment flocculation reaction became positive both reactions becoming normal together.
D. H.

Monteiro (J. Lemos) & da Fonseca (Flavio). Typho exanthematico de S. Paulo. XII. Sobre um " virus " isolado de ratos da zona urbana da cidade e suas relações com o do typho exanthematico de S. Paulo. [**Exanthematic Typhus of S. Paulo. XII. Relations of the Virus with that Isolated from Urban Rats.**]—*Brasil-Medico.* 1932. Dec. 10. Vol. 46. No. 50. pp. 1029–1033. [15 refs.]

The authors isolated a virus from town rats (*Epimys norvegicus*) in S. Paulo and compared it with the virus from human cases of the local form of endemic typhus. By inoculation experiments in guineapigs and by absence of cross-immunity, they are convinced that the two are quite distinct. They propose to name the Rickettsia of the rat virus *R. muricola.* *H. H. S.*

Monteiro (J. Lemos) & da Fonseca (Flavio). Typho exanthematico de São Paulo. XI.—Novas experiencias sobre a transmissao experimental por carrapatos—(*Boophilus microplus* e *Amblyoma cajennense*). [**Typhus of S. Paulo. Transmission by Ticks.**]—*Brasil-Medico.* 1932. Nov. 26. Vol. 46. No. 48. pp. 993–995. English summary.

Further work on the transmission of the virus of São Paulo typhus fever has shown that the probable carrier is the tick *Amblyomma cajennense.* Experiment has shown that this tick can convey the disease to man by its bite and that the virus is transmissible hereditarily. Rickettsia have been demonstrated in sections and smears from infected ticks. *D. H.*

Monteiro (J. Lemos) & da Fonseca (Flavio). Nouvelles expériences sur la transmission expérimentale du typhus exanthématique de Sao Paulo par des tiques (*Boophilus microplus* et *Amblyomma cajennense*). [**Experimental Transmission of S. Paulo Typhus by Ticks.**]—*C. R. Soc. Biol.* 1933. Feb. 3. Vol. 112. No. 4. pp. 397–400.

The authors have continued their experimental work on the virus of the S. Paulo typhus in relation to the vector.

The cattle tick *Boophilus microplus* and the horse tick *Amblyomma cajennense* were employed in the experiments described. Ticks were fed on infected guineapigs during the period of fever and later on clean animals, or else an emulsion of the fed ticks was made and injected. In a further experiment eggs were collected which had been deposited by a female tick previously fed on an infected guineapig and an emulsion of these eggs was injected into guineapigs. Only in 1 instance out of 9 was the transmission successful with the cattle tick, but on the other hand both by bite and injection of crushed amblyomma ticks or eggs, infection was produced in practically every instance. This tick is a very common one in the district where the disease is most prevalent.

D. H.

Parker (R. R.) & Davis (Gordon E.). **Protective Value of Convalescent Sera of Sao Paulo Exanthematic Typhus against Virus of Rocky Mountain Spotted Fever.**—*Public Health Rep.* 1933. May 12. Vol. 48. No. 19. pp. 501–507. With 2 charts.

The technique employed in testing the protective power of the convalescent sera of animals recovered from exanthematous fever of Sao Paulo was as follows : 0·5 cc. of the sera was mixed with 0·1 cc., 0·25 cc. and 0·5 cc. of serum-virus of Rocky Mountain fever of a known strain of high virulence ; after standing for half an hour the mixtures of convalescent serum and serum-virus were inoculated intraperitoneally into guineapigs. Controls were inoculated with the serum virus in the same dose. Three of the six Sao Paulo sera tested showed complete protection, one other serum gave nearly as good results and with another sample the animals receiving the smaller doses of virus were protected ; the guineapigs receiving the largest dose, 0·5 cc. of serum-virus, showed slight fever (one day only) ; all controls died. The sixth sample of serum gave partial protection. These results, as the authors say, suggest a close relationship between the virus of Rocky Mountain fever

and that of Sao Paulo fever. It remains to be seen whether the sera of animals recovered from Rocky Mountain fever would protect against the virus of Sao Paulo fever. *D. H.*

PARKER (R. R.) & DAVIS (Gordon E.). **Further Studies on the Relationship of the Viruses of Rocky Mountain Spotted Fever and Sao Paulo Exanthematic Typhus.**—*Public Health Rep.* 1933. July 21. Vol. 48. No. 29. pp. 839–843. With 3 charts.

In the present paper the authors report protection tests with the serum of Rocky Mountain fever convalescents against Sao Paulo virus.

Four samples of sera were tested, and all four neutralized the Sao Paulo virus. Crossed immunity tests were also carried out. Twelve guineapigs which had recovered from Rocky Mountain fever were taken ; of these 6 were inoculated with Sao Paulo virus and 6 were reinoculated with Rocky Mountain fever virus. In each group 5 guineapigs did not react in any way and 1 had slight fever.

The authors conclude that these data, together with the previous findings, suggest that Sao Paulo typhus and Rocky Mountain spotted fever are immunologically identical. *D. H.*

DYER (R. E.). **Relationship between Rocky Mountain Spotted Fever and "Exanthematic Typhus of Sao Paulo."**—*Public Health Rep.* 1933. May 19. Vol. 48. No. 20. pp. 521–522.

The virus was received from Sao Paulo. Six infected ticks, *Amblyomma cajennense,* were inoculated into guineapigs and all reacted with fever. The virus has now been passed through 9 generations, 99 animals in all, 90 per cent. of which died. The symptoms noted were exactly the same as those produced by a fairly virulent strain of the virus of Rocky Mountain fever.

Crossed immunity experiments showed that animals which had reacted to Sao Paulo virus and recovered did not react when later inoculated with Rocky Mountain Fever virus and also the Rocky Mountain Fever virus protected against the Sao Paulo virus. The conclusion is that the Sao Paulo disease is identical with Rocky Mountain spotted fever. *D. H.*

BADGER (L. F.). **The Laboratory Diagnosis of Endemic Typhus and Rocky Mountain Spotted Fever with Special Reference to Cross-Immunity Tests.**—*Amer. Jl. Trop. Med.* 1933. Mar. Vol. 13. No. 2. pp. 179–190. With 6 charts.

Three strains of the virus of spotted fever, eastern type, have been studied by the author and compared with the virus of Rocky Mountain spotted fever, western type.

The reactions in monkeys and rabbits were similar but in guineapigs it was noted that the testicular reaction, which is practically invariable with the western type virus, only appeared occasionally with the eastern type virus. An elaborate series of crossed immunity tests was carried out and a series of charts of these tests is given. The author points out that in crossed immunity tests, especially when employing a virus such as true typhus which produces fever alone in guineapigs, the results may be complicated by the presence of bacterial secondary invaders ; careful cultural controls are necessary as well as control

inoculation of animals immunized to the test virus in addition to fresh normal animals. It should be remembered also that spontaneous or natural immunity to typhus viruses may be met with in guineapigs, for instance out of 200 normal animals inoculated with the virus of endemic typhus 11 per cent. failed to react. As an example of the secondary bacterial invaders a strain of *Bact. enteritidis* was studied. A series of immune spotted fever and typhus guineapigs tested with *Bact. enteritidis* showed increased resistance, nearly 53 per cent. failing to react as compared with 11 per cent. in a normal series. In the same way a smaller percentage of animals which had reacted to enteritidis virus failed to react when subsequently inoculated with spotted fever and typhus virus. *D. H.*

Brumpt (E.). La fièvre boutonneuse et la fièvre pourprée des montagnes Rocheuses sont deux maladies distinctes. Résultats de l'épreuve de l'immunité croisée dans les maladies exanthématiques. [**Fièvre boutonneuse and Rocky Mountain Fever Two Distinct Diseases.**]—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1197–1199. With 1 fig.

Two guineapigs which had reacted to the virus of boutonneuse fever were reinoculated on the 9th day of the infection with the virus of Rocky Mountain fever; they showed the typical reaction, fever and swelling of the scrotum, exactly similar to controls, no protection.

Nine guineapigs which six weeks earlier had reacted to typhus virus were inoculated with the virus of Rocky Mountain fever; all reacted as did control animals; *i.e.*, there was again no protection.

D. H.

Badger (L. F.). **Rocky Mountain Spotted Fever and Boutonneuse Fever. A Study of their Immunological Relationship.**—*Public Health Rep.* 1933. May 12. Vol. 48. No. 19. pp. 507–511. With 4 charts.

Professor Brumpt recently carried out a series of cross-immunity experiments with the viruses of Rocky Mountain spotted fever (western type) and of "fièvre boutonneuse" and found that they did not protect against one another. The author obtained the virus of boutonneuse fever from Brumpt who sent to him some infected Rhipicephalus ticks. This virus was tested in cross immunity experiments against the virus of spotted fever of the Eastern States. It was found that guineapigs which had reacted to boutonneuse fever even with only a slight fever did not react when later inoculated with the virus of spotted fever (eastern type); also animals which had recovered from an attack of fever due to spotted fever virus did not react when subsequently inoculated with the virus of boutonneuse fever. The author considers that the results of these tests suggest that boutonneuse fever and Rocky Mountain fever are immunologically identical. *D. H.*

Badger (L. F.). **Rocky Mountain Spotted Fever (Eastern Type)—Virus recovered from the Dog Tick** *Dermacentor variabilis* **found in Nature.**—*Public Health Rep.* 1932. Dec. 30. Vol. 47. No. 53. pp. 2365–2369.

Dog ticks (*Dermacentor variabilis*) were collected in the Eastern States, Maryland and Virginia, where spotted fever (Rocky Mountain

fever) is now known to occur. Emulsions of these ticks were made and inoculated into guineapigs and a virus isolated. This virus was shown to be identical with that of Rocky Mountain fever by the following tests. The symptoms produced in laboratory animals were the same as those produced by a virus of known origin, the brain lesions produced were also comparable. The Maryland virus produced agglutinins for Proteus X19 in the serum of rabbits and monkeys and complete crossed immunity with the virus of Rocky Mountain fever was demonstrated. The same virus was also obtained by feeding ticks on guineapigs.

Tables of the crossed immunity experiments are set out. *D. H.*

BADGER (L. F.). **Rocky Mountain Spotted Fever : Susceptibility of the Dog and Sheep to the Virus.**—*Public Health Rep.* 1933. July 7. Vol. 48. No. 27. pp. 791–795. With 1 fig.

Three dogs, 2 grown and 1 puppy, were inoculated with the virus of Rocky Mountain spotted fever. The inoculations produced no clinical manifestations in the larger dogs ; the puppy reacted with fever and respiratory symptoms. From one of the larger dogs the virus was recovered on the 4th, 6th and 8th but not on the 10th day after inoculation. The virus could not be recovered on the 1st and 2nd day after inoculation in the puppy but was present on the 4th day. A grown dog raised in an endemic area was found to be immune to the virus as were the two dogs employed in the above experiments when tested later.

D. andersoni ticks infected with the virus of Rocky Mountain fever were fed on two puppies. Both became infected after incubation periods of 5 to 6 days. A lamb was injected with the virus and this was recovered from the blood on the 4th, 6th, 8th and 10th days. *D. H.*

DYER (R. E.). **Typhus and Rocky Mountain Spotted Fever in the United States.**—*Milit. Surgeon.* 1933. June. Vol. 72. No. 6. pp. 421–439.

This is the Kober lecture for 1933 delivered to the Association of Military Surgeons of the United States.

A survey of the different types of typhus-like diseases reported in various countries is given ; followed by an interesting historical account of Rocky Mountain spotted fever in the Western States and its recent discovery in the Eastern States of N. America. It is pointed out that epidemic louse-borne typhus was originally imported into Mexico by the Spaniards and has remained prevalent in the Highlands of that country, but has never established itself in N. America although frequently introduced into the States both from Mexico and overseas. Typhus in the States is a true endemic disease and has been shown by the writer and others to be carried from rats to man by the rat flea. Dr. Dyer favours the theory that the virus of typhus is kept alive in rats as a disease of rats and occasionally is transferred to man and if a case of endemic typhus should happen to occur in the midst of a crowded and destitute community who are lousy such a case may be the starting point of a louse-borne epidemic of true typhus. The observation that cases of endemic typhus are common in the States and yet epidemics of louse-borne typhus do not arise may be explained by the fact that practically all cases of endemic typhus occur in the summer and autumn when lousiness is at its lowest ; the maximum prevalence of fleas is in the summer and of lice in the winter. In view

of the confusion of the Eastern type of spotted fever with endemic typhus some of the principal differential diagnostic points are detailed, such as the difference in the distribution of the rash and the fact that spotted fever on the whole is the more severe disease, with rapid pulse compared with the slower pulse of endemic typhus. Inoculation into guineapigs may be necessary, however, before a definite opinion can be given ; the Eastern spotted fever virus does not give rise to scrotal swelling, whereas the western type virus and endemic typhus virus do, and in the former there is also ulceration. A guineapig which has reacted to the virus of spotted fever is protected from the same virus but reacts to the virus of endemic typhus and vice versa. Dr. Dyer remarks that the Weil Felix reaction is of no assistance in differentiating a case of spotted fever from one of endemic typhus, but FELIX considers that the X19 agglutination with the serum of endemic typhus is a main agglutination whereas in spotted fever it is only a group agglutination. The methods of prevention against the two diseases are then discussed, in the one case directed against ticks and in the other against the rat and rat flea. Much further work has yet to be done before the problems of the typhus group of diseases will be finally settled. The lecturer suggests two main questions which require answers :—

1. What relation do the typhus-like diseases bear to each other ?

2. Do these diseases arise from a common source and are their differences due to variations or mutations which are determined by their arthropod hosts ? *D. H.*

PARKER (R. R.). **Certain Phases of the Problem of Rocky Mountain Spotted Fever. A Summary of Present Information.**—*Arch. Pathology*. 1933. Mar. Vol. 15. No. 3. pp. 398–429.

This interesting and important paper contains the results of six years' work on the subject of Rocky Mountain fever by the author and his associates.

Three species of tick have now been demonstrated as carriers in nature of the virus of Rocky Mountain fever, the wood tick *Dermacentor andersoni, D. variabilis* the dog tick and *Haemaphysalis leporis* the rabbit tick ; the first two bite man, the last does not, but serves to keep the infection going among the susceptible rodents and thus supplies a reservoir of the disease. The virus has also been passed successfully in the laboratory by means of *Rhipicephalus sanguineus* and *Amblyomma americanus*, the Lone Star tick, which readily bites man and has been blamed for causing cases of Rocky Mountain fever. The author has studied the virus in the blood and tissues of man and animals and in the tick. As regards the blood virus it has been noted that although as small a quantity of blood as 0·001 cc. may be infective Rickettsia cannot be demonstrated in films of blood.

Tick virus.—If ticks are fed on an infective animal there is a " period of invasion " which may last for 12 days ; during this period the blood virus is changed into " tick virus." If some of these ticks are removed at time of feeding and injected into guineapigs they will be found to be highly infective, but during the " period of invasion " they are non-infective and after that time the virus in the ticks is of low virulence and may only produce a symptomless attack, which however produces immunity—" inapparent infection." Adult ticks and

nymphs do not again feed in the same stage of development but hibernate and during hibernation the virus still remains of low virulence, but after a second blood feed the virus is " reactivated " and may then become of high virulence, with 100 per cent. fatality. The same reactivation occurs in the hot weather, and after this reactivation many more Rickettsia appear in the tick. In a group of infective ticks some may be found which show high virulence and few Rickettsia and others which have low virulence but large numbers of Rickettsia ; the possibility of an ultramicroscopic stage is suggested by these facts. It is interesting to note that the rabbit tick *H. leporis* invariably produces a virus of low virulence. The process in nature, it is suggested, is as follows : the virus survives the winter in adult ticks which in the spring feed on cattle (non-susceptible), eggs are laid and infective nymphs and larvae emerge and feed on small rodents which are susceptible and which become infected ; clean larvae and nymphs feed on these infected animals and pick up the virus which is occasionally passed on to man.

The virulence of the virus in the tick varies from low grade non-symptom-producing to one that will produce 100 per cent. fatality, yet the *maximum* level of virulence is the same in one tick population and this may be high, intermediate, or low. In each tick population the virulence may vary in individual ticks but the maximum virulence is never exceeded for that district.

In the opinion of the author the virus of Rocky Mountain fever is widespread in the tick population of America, but where the virulence is low human cases do not occur or are so slight as to escape detection. Diagnosis of cases may be assisted by (1) Infection tests. Positive results are readily obtained by inoculation of small quantities of blood into guineapigs. (2) The Weil-Felix reaction is also useful as an aid to diagnosis. (3) Protection tests ; the serum of the case is mixed with known virus and inoculated into guineapigs.

As regards control and prevention the author recommends : (1) avoidance of tick bites by keeping clear of known dangerous areas ; if this is impossible then special clothing should be worn, (2) early removal of ticks. As ticks when they first attach to bite contain only a low grade virus and the virus takes some hours to reactivate, it is possible, if ticks are removed at once, to avoid infection. It should be remembered that if a tick has recently fed or partly fed and bites again the virus will be reactivated and become of high virulence, and early removal will be of no avail. Thus if exposed to the possibility of infective tick bite careful examination for ticks should be made at least twice a day and all ticks removed. A vaccine has now been prepared from infected ticks and this should be employed in zones where the disease is of a dangerous type. *D. H.*

PHILIP (Cornelius B.) & PARKER (R. R.). **Rocky Mountain Spotted Fever. Investigation of Sexual Transmission in the Wood Tick** *Dermacentor andersoni.*—*Public Health Rep.* 1933. Mar. 17. Vol. 48. No. 11. pp. 266–272.

The experiments recorded in this paper demonstrate that Rocky Mountain spotted fever virus may be transmitted from infected ticks of one sex to normal individuals of the opposite sex during copulation ; these other ticks can then infect animals by their bite. *Dermacentor andersoni* was the tick employed. *D. H.*

Parker (R. R.), Philip (Cornelius B.) & Jellison (Wm. L.). **Rocky Mountain Spotted Fever. Potentialities of Tick Transmission in Relation to Geographical Occurrence in the United States.**—*Amer. Jl. Trop. Med.* 1933. July. Vol. 13. No. 4. pp. 341–379. With 10 charts & 1 plate. [31 refs.]

This paper concerns the transmission of Rocky Mountain spotted fever by 8 species of North American ticks.

Information relative to the known carriers, *D. andersoni*, *D. variabilis* and *Haemaphysalis leporis* (the rabbit tick) is summarized. Protocols of transmission experiments of 5 additional species of ticks are now given. Generation to generation transmission from larva to larva has been demonstrated with 3 of these, *D. occidentalis*, *Rhipicephalus sanguineus* and *Amblyomma americanus*, the lone star tick and with two other species, *A. cajennense* and *D. parumapertus* (rabbit Dermacentor); continuity of infection from larva to adults was shown. These data are considered sufficient to indicate that each of these species is a possible natural carrier of spotted fever virus either from rodent to rodent or rodent to man. In all sections of the United States there are ticks that are actual or potential carriers of the virus either in nature only or to man as well.

It is interesting to note that two of these ticks, *R. sanguineus* and *A. cajennense*, have already been shown to be carriers of disease, the former of the virus of boutonneuse fever and the latter of the typhus fever of Sao Paulo, and that recently both these diseases, which resemble spotted fever clinically, have been shown to be immunologically identical with that disease. *D. H.*

Brumpt (E.). Hôtes vecteurs vicariants du virus de la fièvre pourprée des montagnes rocheuses. [**Vicarious Vectors of the Virus of Rocky Mountain Fever.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 28. pp. 1362–1366.

In carrying out these experiments in France Professor Brumpt utilized a Rocky Mountain fever virus received from Dr. Parker in Montana, U.S.A. Referring to this virus Professor Brumpt says "qui donne à l'homme, ainsi que les excellents collègues qui m'ont soigné au cours de mon infection accidentelle ont pu constater, une maladie extrêmement grave." [All readers of this *Bulletin* join in congratulating Professor Brumpt on his recovery from his dangerous illness.] The local ticks employed in this research were *Dermacentor reticulatus*, *Rhipicephalus sanguineus*, *Amblyomma cajennense*, *Haemaphysalis concinna*, and the author found that the virus of Rocky Mountain fever could adapt itself completely to all these ticks and they conveyed the infection from infected to normal guineapigs.

D. H.

Rumreich (Adolph S.). **The Typhus and Rocky Mountain Spotted Fever Group: Developments in Epidemiology and Clinical Considerations.**—*Jl. Amer. Med. Assoc.* 1933. Feb. 4. Vol. 100. No. 5. pp. 331–334. With 3 figs.

The author refers to cases of spotted fever (Rocky Mountain fever) which have recently been shown to occur in the Eastern States along the Atlantic seaboard of America. Similar cases had previously been confused with epidemic or endemic typhus and enteric fever. He

sets out in detail the differential diagnosis on epidemiological and clinical grounds between endemic typhus and spotted fever.

The following points are noted : cases of endemic typhus are predominantly of urban origin and occur in association with rat infestation ; spotted fever occurs in persons living in rural sections on premises which may be rodent free and in a significantly high percentage there is a history of tick bite. [Compare FLETCHER's two types of tropical typhus, urban and scrub.]

The incubation period of endemic typhus is from 7 to 14 days, that of spotted fever less than a week. The rash in endemic typhus appears on the 4th to 6th day, first on the chest and abdomen, then on the arms and legs, with in many cases no further extension. The rash is macular, rose or dull red in colour, fading on pressure, later papular and persists from 2 to 9 days, then rapidly fades. In spotted fever the rash nearly always appears first on the wrists and ankles, next on the back and then becomes generalized ; the palms and soles are frequently involved and the face commonly. The rash at first consists of rose macules but later becomes petechial and purpuric and is most abundant on wrist, ankles, legs, back, chest, abdomen, palms, soles and face, in the order named. It may persist for weeks as purple or yellowish brown spots. In spotted fever enlargement of the spleen and Kernig's sign are noted. The mortality in spotted fever, Eastern type, is from 20 to 25 per cent., the mortality in endemic typhus less than 1 per cent. Endemic typhus is rare in children, whereas spotted fever predominates in them. *D. H.*

HARRIS (Paul N.). **Histological Study of a Case of the Eastern Type of Rocky Mountain Spotted Fever.**—*Amer. Jl. Path.* 1933. Jan. Vol. 9. No. 1. pp. 91–104. With 19 figs. on 4 plates. [12 refs.]

The author made a very complete and careful examination of the histopathology of a fatal case of the Eastern States type of spotted fever (Rocky Mountain fever). His findings agree with those of WOLBACH in European typhus but like LILLIE* [this *Bulletin*, Vol. 29, p. 445] he found a third type of lesion in the brain which so far has not been described either in European typhus or in the Western type of spotted fever.

This lesion is a very striking one and was more extensive than the usual typhus lesions which were also present ; it occurs in close association with partially or completely occluded arterioles and consists essentially of degeneration in an adjacent focus of the axones ; these are seen to be greatly swollen and nearly globular at points. The conditions present in this case are very fully illustrated by excellent microphotographs. It remains to be seen whether now that this special lesion has been described further research may not reveal it also in the Western type of spotted fever and in typhus. *D. H.*

LITTERER (Wm.). **Rocky Mountain Spotted Fever (Eastern Type) in the Southern States. Report of Six Cases in Tennessee.**—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 407–414. With 6 figs.

A historical account is given of Rocky Mountain spotted fever in the Western States of America from the year 1880 when the disease was first described clinically.

* LILLIE (R. D.). *Public Health Rep.* 1931. Vol. 46. pp. 2840–2859.

The author points out that the virulence of the disease varies greatly, the mortality rate in the Bitter Root valley, Montana, being as high as 80 per cent. whereas in Snake River Valley in Idaho the rate is only 5 per cent. During the last two or three years a new endemic area of the disease has been discovered in the Eastern States, Maryland and Virginia, and along the Atlantic seaboard. The first case, discovered in Tennessee in 1931, is described in this paper along with 5 later cases. The patient, a child aged 5 years, was admitted to hospital in June 1931. A diagnosis of measles first suggested itself but Koplik's spots were not present and Kernig's sign was positive and later there was marked oedema of the face. The child died on the 13th day of the fever ; a very careful autopsy was made and revealed the typical lesions of spotted fever. Blood taken during the fever and inoculated into guineapigs produced fever but no swelling of the scrotum, thus differing from the reaction of the Western type virus. This strain of virus was established in guineapigs and 35 per cent. of those inoculated died ; there was no scrotal enlargement but the spleen was enlarged and there were numerous lesions in the brain. Guineapigs which had reacted to the Tennessee virus and recovered did not react when inoculated with Western type spotted fever virus but did when inoculated with the virus of endemic typhus (Brill's) and also developed swelling of the testicles.

Of the 5 further cases described 4 were in children and one in a young man of 19 ; all recovered although all were dangerously ill. The second case was in a brother of Case No. 1 and it is of interest to note that six weeks before these children were taken ill a hound from the Montana endemic area was imported by their next-door neighbours and the children played with this animal. Although there is some evidence that the infection may have occurred in this way, the virus isolated gave the reaction of the Eastern type of virus and not the Western.

Ticks, *Dermacentor variabilis*, were collected from local dogs and inoculated into guineapigs but none reacted. The Weil-Felix reaction with Proteus X19 became positive in all the 6 cases but not in high dilution. Guineapigs inoculated with spotted fever tick vaccine, western type, did not react when inoculated with the Tennessee virus.

D. H.

Crutcher (John S.), Jr. **Rocky Mountain Spotted Fever.**—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 415–417.

This paper, written by the physician in charge of the case in hospital, gives a full clinical account of Case No. 1 described in Dr. Litterer's paper (above). The differential diagnosis is discussed. Measles is confusing early in the disease because in addition to similarity in the rash Rocky Mountain fever patients show coryza. Typhus fever may be almost identical and crossed immunity tests in animals may be the only conclusive evidence ; but the seasonal distribution is different and endemic typhus is an urban disease whereas spotted fever is as a rule rural.

D. H.

Public Health Reports. 1933. May 5. Vol. 48. No. 18. pp. 471–473.—**The Prevention of Rocky Mountain Spotted Fever.**

There are three measures which individuals may take to prevent spotted fever.—(1) Avoid ticks. (2) Remove ticks from the person as early as possible. (3) Be vaccinated.

The first may be carried out by avoiding areas where ticks and especially infected ticks are known to be prevalent; where this is not possible special protective clothing should be worn. Even if this precaution is taken it is essential in infected areas to make a careful examination of the clothing and the body and to remove all ticks at the earliest opportunity, at least twice a day. Two or three inoculations of the vaccine give a degree of protection sufficient to last one season, *i.e.*, May to August. *D. H.*

Richards (G. Gill). **Rocky Mountain Spotted Fever.**—*Ann. Intern. Med.* 1933. Mar. Vol. 6. No. 9. pp. 1207–1211. [12 refs.]

A paper read before a meeting of the American College of Physicians at San Francisco, California, on April 7, 1932, which gives an historical and clinical account of the disease as it is known in the Western States of North America. Nothing new. *D. H.*

Combiesco (D.). Sur une épidémie de fièvre exanthématique : fièvre boutonneuse ou fièvre escharonodulaire (observée à Constantza [Roumanie]). (Premier mémoire.) [**Epidemic of Eruptive Fever, Fièvre Boutonneuse or Escharonodular Fever seen at Constantza.**] —*Arch. Roumaines Path. Expérim. et Microbiol.* 1932. June. Vol. 5. No. 2. pp. 311–388. With 48 charts & 25 figs. [49 refs.]

The author has already published several papers dealing with his work on exanthematous (eruptive) fever in Rumania (this *Bulletin*, Vol. 29, pp. 455-6, 794). The present paper gives an account of the same work but in greater detail. A careful and detailed description of the clinical symptoms in 9 cases is given with figures of the temperature charts and photographs of the rash, two of which are reproduced here (Fig. 1) (photo No. 1) showing the primary sore at site of tick bite and Fig. 2 (photo No. 5) showing the peculiar distribution of the rash on the soles of the feet, not seen in true typhus but noted in tropical typhus and in Rocky Mountain Fever.

The epidemiology is briefly dealt with: the disease occurs, as in the south of France, in the warm weather, July, August and September; no lice were found on any of the patients but in 27 out of 33 cases dogs heavily infested with ticks, *R. sanguineus*, were found in the houses.

Experimental Researches.—Ticks were collected from these dogs and an emulsion made and injected into two patients suffering from general paralysis; both of these developed typical attacks of the fever. The author also showed that the virus retained its infectivity for considerable periods of time in the tick and was hereditarily transmitted.

Blood taken from patients suffering from the fever on the 4th and 5th day and injected subcutaneously into volunteers proved to be infective in doses of 5 to 10 cc. An interesting observation was that when the injection was made intradermally as well as subcutaneously a typical primary sore, tache noire, developed at the site of inoculation (Fig. 3) (photo 23) whereas with subcutaneous or intravenous injection no primary sore developed although infection may follow.

The primary sore appears some 2 or 3 days before the fever and a series of subsidiary papules appear around it, an indication of local

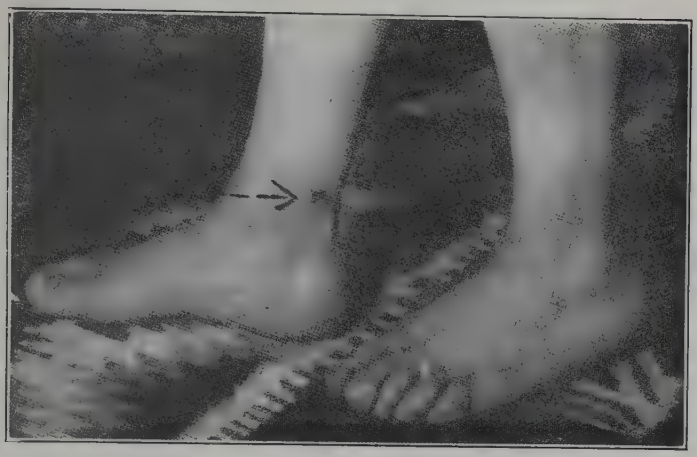


Fig. 1. Showing primary sore (*'tache noire'*) at site of tick bite in patient with fièvre boutonneuse.

Fig. 2. Showing eruption on soles of feet of patient with fièvre boutonneuse.

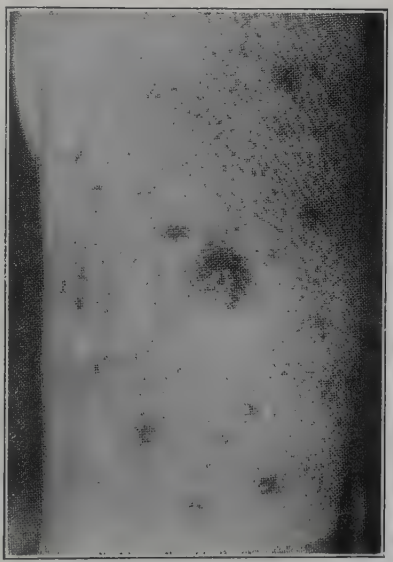


Fig. 3. Showing primary sore (*'tache noire'*) at site of intradermal inoculation, with subsidiary papules around it nine days after inoculation.

[Reproduced from the *Archives Roumaines de Pathologie Expérimentale et de Microbiologie.*]

multiplication of the virus. (Fig. 3.) The intradermal and subcutaneous injections are carried out in one operation, the needle of the syringe being inserted through the skin and then directed upwards and outwards into the under surface of the skin : a few drops of blood are injected, the point of the needle is then slightly withdrawn and

the remainder of the dose of blood is injected into the subcutaneous tissue.

Animal Experiments.—Monkeys inoculated with the blood of patients developed fever and their blood was shown to be infective for man; white mice, guineapigs and the spermophile were also shown to be susceptible.

Laboratory Investigations.—Numerous blood counts were made and it was noted that there was a slight polynuclear leucocytosis during the fever. It was clearly shown that if the Weil-Felix reaction is carried out with the serum of patients after the fever has ceased, *i.e.*, in early convalescence, a positive reaction can be obtained: the strains employed were HX19, OX19 and HX2. It was also noted that a positive serum if kept for a few days and then again tested will give a considerably higher reaction on the second occasion.

Histopathology.—Sections were made through portions of skin papules removed about the 9th day of the illness: these showed, when suitably stained, definite nodules around the small vessels in the skin comparable to the typhus nodule. The proliferated cells in these nodules were monocytes of the reticulo-endothelial system. No bodies resembling Rickettsia could be seen in the sections.

D. H.

Marcandier, Plazy & Pirot (R.). Fièvre boutonneuse dans le milieu maritime à Toulon. [**Fièvre boutonneuse in the Maritime Quarter of Toulon.**] —*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 354–365. [16 refs.]

At one time the ship fever at Toulon was thought to be the same as Marseilles fever, but it has now been definitely shown to be endemic typhus or Brill's disease. However it has also been found that among the shore establishment in Toulon fièvre boutonneuse does occur in people living in the suburbs of the city in association with tick infested dogs. Ten cases have been diagnosed during the last five years. A careful clinical description and experimental details of these cases are given. The Weil-Felix reaction was positive in 6. Crossed immunity experiments were negative with "typhus murin"; that is to say, animals which had reacted to the virus of fièvre boutonneuse later reacted to the virus of typhus and *vice versa*. *D. H.*

Combiesco (D.) & Zotta (G.). Sur la transmissibilité héréditaire du virus de la fièvre boutonneuse (fièvre exanthématique de Marseille) chez la tique *Rhipicephalus sanguineus*. [**Hereditary Transmission of Virus of Fièvre boutonneuse in** *R. sanguineus*.] —*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1223–1224.

Female ticks (*R. sanguineus*) were captured in Constantza, Rumania, on 15 August 1931 and kept in glass tubes in which they laid eggs. Larvae developed and in February 1932 some were emulsified and inoculated into a volunteer; this man duly developed a typical attack of fever. *D.H.*

Combiesco (D.) & Zotta (G.). Fièvre boutonneuse (fièvre exanthématique de Marseille) après inoculation intra-oculaire expérimentale du produit de broyage de *Rhipicephalus sanguineus*. [**Fièvre boutonneuse after Intra-ocular Inoculation of Emulsion of** *R. sanguineus*.]—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1222–1223.

Accidental infection through the conjunctiva by the virus of boutonneuse fever has been reported in laboratory workers and in persons who have removed ticks from dogs and crushed them between the fingers. In these cases the primary lesion was in the eye and fever and rash duly followed. The authors made an emulsion of infected ticks and inoculated it into the conjunctiva of two invalids ; both reacted, one a mild case with typical rash and severe conjunctivitis, the other a very light case of fever without rash but obviously one of boutonneuse fever. *D. H.*

Brumpt (E.). Longévité du virus de la fièvre boutonneuse (*Rickettsia conori*, n. sp.) chez la tique, *Rhipicephalus sanguineus*. [**Longevity of the Virus of Fièvre boutonneuse in** *R. sanguineus*.]—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1199–1202.

Ticks were collected from dogs in Marseilles in April 1930, and larvae were bred from these in the laboratory. On 17th October an emulsion was made of some of these larvae and inoculated into a hospital patient who duly developed fever with typical eruption. On 10th December a fresh emulsion was prepared from the same batch of ticks and inoculated again with positive results. 17 months later the ticks were still infective. A male guineapig was inoculated with an emulsion of the larvae and developed fever and swelling of the scrotum. Rickettsia bodies were demonstrated in smear preparations from the tunica and were named *R. conori* in honour of the original discoverer of the disease. *D. H.*

Caminopetros (Jean) & Contos (B.). Transmission de la fièvre boutonneuse au cobaye. [**Transmission of Fièvre boutonneuse to the Guineapig.**]—*C. R. Acad. Sci.* 1932. Sept. 19. Vol. 195. No. 12. pp. 546–548.

The authors inoculated large quantities (5 to 10 cc.) of blood from typical cases of eruptive fever into male guineapigs. After an incubation period of 8 to 13 days they reacted with fever and swelling of the scrotum. The blood of monkeys which had been inoculated with an emulsion of infective ticks produced a similar reaction, as did the blood and tissues of infected spermophiles. An emulsion of the tunica of one of these guineapigs was shown to be infective for man.

The authors have also shown that the serum of convalescents and of monkeys inoculated with killed virus has the power of neutralizing a dose of the living virus (emulsion of ticks) whereas the serum of typhus convalescents does not. Seventeen guineapigs which had reacted to the boutonneuse fever virus when tested later with the virus of typhus all reacted and vice versa, i.e., there is no crossed immunity. The virus both of true typhus and of Brill's disease was employed.

D. H.

Caminopetros (Jean) & Contos (B.). Nouvelles données sur la fièvre boutonneuse expérimentale du cobaye. Renforcement du pouvoir pathogène du virus par passage sur le rat blanc. [**Experimental Fièvre boutonneuse in the Guineapig.**]—*C. R. Soc. Biol.* 1933. Feb. 3. Vol. 112. No. 4. pp. 355–357.

Caminopetros and his co-workers, who first showed that guineapigs reacted to the virus of fièvre boutonneuse in the same manner as they do to the virus of endemic typhus, have now passed the former virus in series through 16 generations; of 40 animals which reacted in this series 28 showed definite scrotal reaction as well as fever. The authors have also found that if guineapigs are killed on the 2nd day of the fever and an emulsion is made of the brain and injected intraperitoneally into other guineapigs the scrotal reaction is invariably produced, whereas if blood or tissue is taken later in the disease only fever results.

The authors have also passaged the virus through white rats; these animals develop fever but so far only one animal showed a one-sided scrotal reaction. Emulsions of the brain of infected white rats taken between the 6th and 15th day and injected into guineapigs have given constantly a typical scrotal reaction. *D. H.*

Durand (Paul). Rôle du chien comme réservoir de virus dans la fièvre boutonneuse. [**Role of the Dog as Reservoir of the Virus of Fièvre boutonneuse.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 239–250. With 5 figs.

The author selected two pups aged two days, removed them from their mother and brought them up by hand carefully protected from all risk of tick bite. At the age of two months they were inoculated with an emulsion of infected ticks (*R. sanguineus*); neither reacted with fever or other symptom, but 25 cc. of blood was taken 10 days after the inoculation and injected into two paralytics; both men developed typical attacks of eruptive fever after an incubation period of five days, thus demonstrating that the dog is susceptible to the virus of this fever.

Again, infected ticks were taken from Tunis to Lyons, a district where *R. sanguineus* has never been noted and where eruptive fever has not occurred; two local dogs, aged $2\frac{1}{2}$ and 8 months, were inoculated with an emulsion of the imported ticks; neither reacted, but 10 days later 50 cc. of their blood was inoculated into each of two men and both developed typical attacks of fever. The author points out that previous attempts to infect dogs have failed because the experiment has been carried out with animals which have already been exposed to the bites of infected ticks. *D. H.*

Blanc (Georges), Noury (M.) & Fischer (M.). Sensibilité de l'ecureuil de Gétulie (*Atlantoxerus getulus*) au virus de la fièvre boutonneuse. [**Receptivity of the Getulie Squirrel to the Boutonneuse Virus.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 20. pp. 357–358.

This small rodent of Morocco is very similar to the spermophile of Macedonia, already shown to be susceptible to the virus of boutonneuse fever. The blood of a case of fever and also infected ticks were inoculated into the animals. Although there was no febrile reaction, the tissues proved infective for guineapigs. There was some enlargement of the spleen in the "squirrel." *D. H.*

Caminopetros (Jean), Pheloukis (Th.) & Contos (B.). Sensibilité du cheval au virus de la fièvre boutonneuse (" Rickettsia Blanci " n. sp.). [**Susceptibility of the Horse to the Virus of Fièvre boutonneuse.**]—*Bull. Acad. Méd.* 1933. June 20. 97th Year. 3rd Ser. Vol. 109. No. 24. pp. 835–837.

Seventeen horses were utilized in this research, the intradermal method of inoculation being employed ; 8 horses were inoculated with an emulsion of infected ticks, 7 with the scrotal fluid of guineapigs and 2 with emulsion of brain. The first two inocula, which were rich in Rickettsia, gave much the most severe reactions ; all the horses developed fever. Subconjunctival inoculation also proved successful. The blood of the horses taken during the fever proved infective for guineapigs. Some of the horses were immunized by repeated doses of virus and it is proposed to utilize their serum therapeutically.

D. H.

Joyeux (Ch.) & Piéri (J.). Le lapin peut constituer un réservoir de virus pour la fièvre boutonneuse (exanthématique). [**The Rabbit as Reservoir of Virus of Fièvre boutonneuse.**]—*C. R. Acad. Sci.* 1932. June 27. Vol. 194. No. 26. pp. 2342–2343.

Rabbits can be infected by injection of emulsion of infected ticks and the virus can be recovered from the brain. *D. H.*

Troisier (J.) & Cattan (R.). Comportement du virus de la fièvre boutonneuse sur le cobaye et sur le singe. [**Behaviour of the Virus of Fièvre boutonneuse in Guineapig and Monkey.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 346–348.

The authors point out that they published in 1931 an account of experimental work showing that the blood of cases of fièvre boutonneuse inoculated into guineapigs produced after an incubation period of 10 days a definite febrile reaction but no scrotal reaction ; their work therefore preceded that of Caminopetros in Rumania. In monkeys the virus produces fever with an eruption on the face and a positive Weil-Felix reaction. Monkeys which die of the infection show histological lesions resembling those of typhus. *D. H.*

Caminopetros (Jean) & Contos (B.). Intradermoréaction à la fièvre boutonneuse. [**Intradermal Reaction to Fièvre boutonneuse.**]—*C. R. Acad. Sci.* 1933. Mar. 27. Vol. 196. No. 13. pp. 967–969.

The authors have already shown that the serum of convalescents from fièvre boutonneuse possesses a neutralizing power on the virus ; this appears about the 9th day of the fever and reaches a maximum on the 15th day.

The intradermal injection of 0·5 cc. or 1 cc. of virus, an emulsion from swollen testis of guineapig or infected ticks, gives rise to a "giant" reaction, tache noire, at site of the injection, followed by fever in 24 hours.

The authors have found that if the virus be heated or formalinized before injection into the skin the remarkable local reaction appears but not the fever ; using 0·25 cc. of this antigen the large tache noire

begins to appear as a roseate patch one hour after injection, reaches the maximum after 48 hours and disappears in 3 to 4 days, but a small intradermal " button " remains for one month. In actual cases after the 9th day and in convalescents a modified and mild reaction only appears which differs markedly from the typical reaction in susceptible people. *D. H.*

Ugo (Reitano) & Boncinelli (Umberto). Isolement d'un germe semblable aux Rickettsia, du sang d'une malade atteinte de typhus bénin estival. [**Isolation of Rickettsia-like Organism from Blood in " Typhus bénin estival."**]—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1932. Oct. Vol. 4. No. 10. pp. 261–264.

" Typhus bénin estival " is here employed as a synonym for fièvre boutonneuse or eruptive fever.

Several cc. of blood were taken from a patient at the height of the fever and citrated ; 1 cc. was placed in tubes of a special culture medium, Vernoni's (glucose agar + rat brain + a few cc. of ascitic fluid), control tubes were put up and tested for sterility from time to time. On the 16th day growth was noted in two of the tubes, demonstrated by cloudiness of the medium. Films made from this and stained showed small organisms which were not stained by Gram but were stained reddish by Giemsa. The morphology of these small bodies was similar to that of Rickettsia. Subcultures were made with success but inoculation of the cultures into guineapigs and volunteers gave negative results. *D. H.*

Shipley (P. G.). **Tick-Bite Fever in Children.**—*Bull. Johns Hopkins Hosp.* 1932. Aug. Vol. 51. No. 2. pp. 83–101. With 8 figs.

The author classifies the typhus-like fevers of the United States as follows :—

1. Epidemic (European) typhus fever.
2. Brill's Disease.
3. Endemic (American) typhus (tabardillo).
4. Tick bite fever
   (*a*) Rocky Mountain spotted fever.
   (*b*) Tick bite fever of the East Coast.

He is of the opinion that the tick typhus or tick bite fever met with in the Eastern States of America is an indigenous disease and is not Rocky Mountain fever introduced from the west. The disease in the Rockies is carried by the tick, *Dermacentor venustus*, which does not exist in Maryland where it is replaced by the common wood or dog tick, *D. variabilis*. This tick appears every year in early March in enormous numbers and can be found easily up to September ; it is during this season and then only that cases of tick typhus are met with. The author was able to maintain two strains of the local virus in guineapigs and to compare their action on these animals with that of the virus of Rocky Mountain fever (Montana). The local virus produced fever and swelling of the scrotum in male guineapigs, a reaction closely resembling that produced by the virus of Brill's disease, but did not produce the severe and fatal reaction with gangrene of the scrotum and feet which is usually caused by the virus of Rocky Mountain fever ; but there was crossed immunity between the local virus and the virus of Rocky Mountain fever, i.e. the viruses proved

to be identical immunologically, whereas the virus of the local tick typhus did not protect against the virus of Brill's disease or vice versa. The author carefully studied six cases of the local tick bite fever in children. He notes that the disease is by no means mild although all his six cases recovered ; he cites a fatality rate of nearly 20 per cent. although it is possible that many mild cases escaped detection. In all the cases investigated there was a history of exposure and in two cases an actual history of tick bite and in one instance the tick was removed from the ear of the patient. A small ulcer may develop at the site of the tick bite and swelling of the lymph glands was noted, but the description of this ulcer hardly tallies with that of the " tache noir " of Marseilles or the primary sore of tsutsugamushi disease. Definite stupor and nocturnal delirium were noted in the severe cases with a haemorrhagic rash which involved the entire body, including the palms and soles. The clinical symptoms suggested European typhus rather than Brill's disease. The Weil-Felix reaction was positive in all six cases in significant dilutions. Proteus X19 and X2 were employed. *D. H.*

Pijper (Adrianus) & Dau (Helene). Zuid-Afrikaansche tekebeetkoorts en behandeling van algemeene paralyse. [**South African Tick-Bite Fever and Treatment of General Paralysis.**]—*Nederl.-Tijdschr. v. Geneesk.* 1933. May 6. Vol. 77. No. 18. pp. 2030–2037. With 5 charts. [13 refs.] English summary (7 lines).

The substitution of tick-bite fever infection for malarial infection in general paralysis was not successful therapeutically, but the occasion of its use has given the authors opportunity to clear up certain points relating to this disease.

Tick-bite fever belongs to the typhus-like diseases, is markedly benign, but differs definitely from a mild typhus. It resembles closely the " pseudo-typhus " of Deli in showing a primary cutaneous sore, with enlargement of regional lymph glands. In all probability it has a widespread distribution from Kenya to Cape Town. This affection is indeed the most benign of the typhus-like diseases. It has no mortality, no complications and no sequelae. The disease is transmitted by the tick *Amblyomma hebraeum* only in the larval stage which, being almost microscopic, is not observed. The first indication of infection, then, is the primary sore. Its incubation period is 7 to 9 days and symptoms are headache, a rash on the palms and soles, photophobia, sometimes hallucinations and a fever that lasts for 10 days. The serum of patients gives an agglutination of fine-flocculation type with the proteus strains X2, X19, and X Kingsbury during convalescence. Guineapigs intraperitoneally injected react sometimes with a temperature curve similar to that given by the typhus fever virus and Rickettsia-like bodies are found in nodules which appear in the nervous system of some of the animals. " The virus can be kept alive in guineapigs and has reached its seventieth passage in the authors' laboratory." Both typhus and tick-bite fever virus can develop an immunity in guineapigs but although a typhus immune guineapig is protected against tick-bite fever virus, the reverse is not the case. Three individuals were injected with about 3 cc. of a rather thick brain suspension from an infected guineapig. All three developed more or less characteristic symptoms and in the third case the virus was recovered from the patient's blood.

W. F. Harvey.

ROBERTS (J. Isgaer) & TONKING (H. D.). **A Preliminary Note on the Vector of Tropical Typhus in Kenya.**—*East African Med. Jl.* 1933. Feb. Vol. 9. No. 11. pp. 310–315.

Up to the present only circumstantial evidence has pointed to tropical typhus in Kenya being carried by a tick; the popular local name for the disease is "tick typhus." In houses in which cases of the disease have occurred numerous ticks were found especially *Rhipicephalus sanguineus*, the dog tick. Emulsions of these ticks injected into guineapigs produced fever and swelling of the scrotum. The virus has been passaged to other guineapigs. Smears and sections of tissues of these animals revealed the presence of Rickettsia bodies; in one instance when the scrotal reaction was especially severe filamentous threads about 20μ long were seen in sections of the testes. Histologically vascular lesions were the most noticeable feature in the tissues examined. *D. H.*

LINDEMAN (S. J. L.). **Two Cases of Tropical Typhus and Other Fevers.** —*Jl. Roy. Army Med. Corps.* 1933. Feb. Vol. 60. No. 2. pp. 136–138.

An interesting account of the sequelae of a 3 days' pig sticking excursion by 5 British officers in the Hyderabad (Sind) neighbourhood. Within a fortnight of their return to cantonments three of the officers were admitted to hospital with fever; one was a definite case of enteric fever, blood culture positive; one was a case of undulant or relapsing fever not bacteriologically diagnosed, and the third was a typical case of tick typhus, Weil-Felix reaction not tested. A similar case to No. 3 was met with a few months later, in which the Weil-Felix reaction negative at first became positive later. *D. H.*

MARTIN (C. de C.) & ANDERSON (L. A. P.). **A Case of Tropical Typhus Serologically Related to "Scrub Typhus" of the Federated Malay States.**—*Indian Med. Gaz.* 1933. Aug. Vol. 68. No. 8. pp. 432–435. With 1 chart.

A man of 40 was admitted to hospital in Rangoon with fever and typhus-like rash. He had just returned from a tour in the jungle and gave a history of a painful insect bite on the forearm (insect not identified). He was acutely ill with low muttering delirium. Clinically the case was typical of typhus. The Widal reaction was negative on 3 occasions, also the Weil-Felix reaction, using Felix technique and Proteus X19, was negative on two occasions. Later when the patient had completely recovered and had left hospital it was possible to test his serum, taken on 18th day of disease, against Proteus XK. This gave standard agglutination in a dilution of 1/2500, which may be taken as diagnostic. *D. H.*

ANIGSTEIN (L.). Observations concernant la variabilité des souches cultivées du typhus tropical. [**The Variability of Cultivated Strains of Bacteria from Tropical Typhus.**]—*C. R. Soc. Biol.* 1933. Apr. 27. Vol. 112. No. 14. pp. 1449–1451.

Seventy-six strains of bacteria were isolated from the blood of cases of tropical typhus and from experimental animals employed in the research.

These bacteria could be separated into 3 groups according to their biochemical reactions.—(1) No fermentation of sugars or alcohols, no indol produced. (2) Ferment lactose and other sugars but no production of gas. (3) Non lactose fermenters but produce acid and gas in other sugars and indol.

Groups 1 and 2 were not agglutinated by Proteus sera but many members of group 3 were so agglutinated. Three strains of bacteria of groups 1 and 2 after 3 years subculture showed characteristics of Proteus and became agglutinable by X19 sera. These bacteria when first isolated morphologically resembled Rickettsia. *D. H.*

Dinger (J. E.). Tropical (" scrub ") typhus bij witte muizen. [**Tropical (Scrub) Typhus in White Mice.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Mar. 14. Vol. 73. No. 6. pp. 329–349. With 1 plate. [23 refs.] German summary.

Blood taken on the 11th to 12th day of fever in a case of " scrub typhus " and inoculated intracerebrally into white mice produced a fatal illness in 100 per cent. of the animals. On post-mortem examination acute fibrinous peritonitis and pleurisy were noted and rickettsia were found in the endothelial cells of the pleura. The blood of the mice was infective from the 3rd day after inoculation and remained so till death. Monkeys showed no reaction when inoculated with material from infected mice, but injection of similar material into the anterior chamber of the eye of rabbits produced changes similar to those described by Japanese workers with the virus of Japanese River fever. Guineapigs inoculated with material from infected mice reacted in a typical manner with fever and swelling of the testicles. No positive Weil-Felix reaction was noted in any of the experimental animals. *D. H.*

Kawamura (R.), Imagawa (Y.) & Ito (T.). Ein neues Phänomen postmortaler Proliferation der Rickettsien bei der Tsutsugamushi-Krankheit. [**Post Mortem Proliferation of Rickettsia in Tsutsugamushi Disease.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Aug. 27. Vol. 125. No. 5/6. pp. 304–312. With 4 figs. [13 refs.]

The general impression has been that in Rickettsia diseases it is necessary, if a positive reaction is desired, to take material from the living patient or from experimental animals ; the authors have found that in the case of Japanese River fever, if the blood or an emulsion of the organs—spleen, lymph gland or bone marrow—be taken 3 hours after death and inoculated intraperitoneally into guineapigs, a stronger positive result is obtained than with the same amount of blood taken from a living patient. The amount of the infective agent in the inoculum is gauged by the number of Rickettsia found in the mesentery of the inoculated guineapigs and the ease with which the virus can be transmitted in series. This is clearly shown in tabular form. Rabbits were inoculated with the Chiba strain of tsutsugamushi virus and were killed during the fever. Blood was taken and emulsion of organs made and tested for infectivity, at periods of 3 hours, 10 hours and 24 hours after death, by intraperitoneal injection into guineapigs and compared with the results from similar doses taken during life. The material tested at 3 hours and 10 hours after death showed increase of Rickettsia, that tested at 24 hours gave exactly the same result as the material taken during

life. Thus it is apparent that in Japanese River fever there is multiplication of the Rickettsia virus specially in the blood and also in the tissues after death. This fact has some bearing on the nature of these organisms and further research is indicated in other diseases in which Rickettsia is found. *D. H.*

KOUWENAAR (W.) & WOLFF (J. W.). Onderzoekingen over de Sumatraansche mijtekoorts. IV. Infectie proeven op caviae. [**Sumatran Mite Fever Infection of the Guineapig.**]—*Nederl. Tijdschr. v. Geneesk.* 1933. Aug. 5. Vol. 77. No. 31. pp. 3547–3557. With 1 fig. & 1 plate. [25 refs.] English summary.

The object of these researches (*ante*, pp. 393–395) has been to determine the position of Sumatran mite-fever among the typhus-like diseases. It is identified with scrub typhus.

Inoculation of the guineapig by the intraperitoneal, intracerebral or intratesticular route with material containing mite fever virus gives rise to a severe and often fatal disease. This material may be blood, cerebrospinal fluid, suspensions made from the primary lesion or bubo of man or apes, suspensions of testicle or other organ of the guineapig. Loss of weight is an early symptom and may appear by the 2nd day, but fever is only seldom seen. A fall of temperature occurs before death, which takes place usually from the 5th to the 14th day. A Weil-Felix reaction is not observed in the course of the affection. Post-mortem appearances are : free and turbid peritoneal fluid with congestion and sometimes mucinous exudate ; enlargement of the testicle and exudate into tunica vaginalis and peritesticular fat especially in intratesticular injection ; no enlargement of the spleen, which is granular owing to prominence of malpighian follicles ; swelling and congestion of the suprarenals ; haemorrhage and infiltration of the lungs ; no macroscopic cerebral changes but microscopically perivascular infiltration, fibroblastic activity, lymphocytic foci, some diffuse gliosis and vascular thrombosis ; swollen and haemorrhagic inguinal glands. " Rickettsiae " may be found in the macrophages and endothelial cells of the peritoneal exudate and also, sometimes, in the testicular exudate. Serial passage of the virus was difficult as the test animals ceased to die. A great increase in the numbers of rickettsiae could be obtained if the diet of the test animals was poor in vitamins, but infection of guineapigs with this rickettsia-rich material was not any more severe than with material in which no rickettsiae could be found. That this infection in guineapigs was really mite fever may be presumed from the cross infection tests in which guineapigs succumbed to infectious material from man, monkey, rabbit and guineapig while a typical mite fever infection could be obtained in rabbits and monkeys with material from guineapigs. A useful table of comparison of signs and symptoms in mite fever, tsutsugamushi disease as seen in Japan and in Annam, fièvre boutonneuse of Marseilles and the Mediterranean littoral, tick fever of South Africa and tropical " scrub typhus " is given. In conclusion the authors separate mite fever from tsutsugamushi disease and identify it with scrub typhus. *W. F. Harvey.*

FINDLAY (G. M.). **The Infectivity of Rift Valley Fever for Monkeys.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 161–168. With 7 figs. [15 refs.]

Three species of African monkeys were tested by injection of Rift Valley fever virus ; they did not develop fever but their blood was

shown to be infective for mice 48 hours later and immune bodies could be demonstrated by the 6th day. South American monkeys on the other hand showed slight fever and their blood was infective; they also developed immune bodies. As in yellow fever, Indian monkeys are most susceptible, then American monkeys and African the least susceptible. *D. H.*

FINDLAY (G. M.). **Cytological Changes in the Liver in Rift Valley Fever, with Special Reference to the Nuclear Inclusions.**—*Brit. Jl. Experim. Path.* 1933. Aug. Vol. 14. No. 4. pp. 207–219. With 24 figs. on 1 plate. [21 refs.]

This paper is entirely concerned with the changes in the liver in sheep and goats and in experimental animals such as the monkey, rat, mouse, etc. Intranuclear inclusions can be found in the liver cells of all these animals when infected with Rift Valley fever. The morphology and tinctorial properties of the inclusions are described and compared with those of other viruses which give rise to inclusions in the nuclei of the cells of the liver. *D. H.*

ANTONINO (Nastasi). La febbre esantematica mediterranea a Tripoli.—*Policlinico.* Sez. Prat. 1933. Jan. 9. Vol. 40. No. 2. pp. 51–57. With 4 figs. [21 refs.]

DE ASSIS (Arlindo). Sobre a agglutinabilidade dos " Proteus X " de Weil-Felix em relação com o soro-diagnostico entre nós.—*Brasil-Medico.* 1933. Jan. 7. Vol. 47. No. 1. pp. 4–9. English summary.

BOON VAN OSTADE (C. H.). Tropical Typhus in Midden-Java.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Nov. 22. Vol. 72. No. 24. pp. 1652–1657. With 3 charts.

FRIEL (Robert). Diseases of the Typhus Group in South Africa. [Correspondence.]—*South African Med. Jl.* 1932. Sept. 10. Vol. 6. No. 17. pp. 578–579.

GUERRICCHIO (A.). La febbre esantematica mediterranea in Lucania.—*Policlinico.* Sez. Prat. 1933. July 24. Vol. 40. No. 30. pp. 1170–1175. With 1 fig.

LAURELL (A.). Ein Fall von Febris wolhynica.—*Klin. Woch.* 1933. May 6. Vol. 12. No. 18. p. 713. With 1 chart.

LO BIANCO (Domenico). Note su alcuni casi di febbre esantematica mediterranea. (Dermotifo benigno estivo endemico.)—*Policlinico.* Sez. Prat. 1933. Apr. 24. Vol. 40. No. 17. pp. 643–650. [18 refs.]

MAZZOLANI (D. A.). La febbre esantematica in Tripolitania.—*Policlinico.* Sez. Prat. 1933. June 12. Vol. 40. No. 24. pp. 928–931.

MONTEIRO (J. Lemos) & DA FONSECA (Flavio). Sur un virus isolé des rats de Sao Paulo, et de ses relations avec le virus du typhus exanthématique de Sao Paulo.—*C. R. Soc. Biol.* 1933. Feb. 3. Vol. 112. No. 4. pp. 402–404. [11 refs.]

PICCOLI (Giovanni). La febbre da pappataci (contributo clinico ed epidemiologico).—*Arch. Ital. Sci. Med. Colon.* 1932. Dec. 1. Vol. 13. No. 12. pp. 714–729. With 7 charts. [40 refs.] English summary (7 lines).

PILLAI (M. D.). A Case of Bandicoot-Bite Fever.—*Indian Med. Gaz.* 1932. Nov. Vol. 67. No. 11. p. 628.

REITANO (Ugo). Le attuali conoscenze sulle malattie del gruppo tifo esantematico.—*Boll. Istituto Sieroterap. Milanese.* 1933. Mar. Vol. 12. No. 3. pp. 221–248. With 21 figs. on 3 plates. [3 pages of refs.] French summary.

Reitano (Ugo) & Boncinelli (Umberto). Risultati della inoculazione del virus della cosidetta " febbre esantematica " agli animali di laboratorio.—*Ann. di Med. Nav. e Colon.* 1932. Nov.–Dec. 38th Year. Vol. 2. Nos. 5–6. pp. 641–663. French summary (9 lines). [42 refs.]

Reitano (Ugo) & Boncinelli (Umberto). Risultati della inoculazione sperimentale del virus della cosidetta " febbre esantematica " all'uomo.—*Ann. di Med. Nav. e Colon.* 1932. Nov.–Dec. 38th Year. Vol. 2. Nos. 5–6. pp. 664–676. French summary. [43 refs.]

Serebrennaja (A. I.), Grünfeld (A. A.) & Neumann (M. W.). Experimentelle Studien ueber das Flecktyphusvirus. II. Mitteilung : Experimenteller Flecktyphus bei Zieseln.—*Zent. f. Bakt.* I. Abt. Orig. 1933. Aug. 15. Vol. 129. No. 3/4. pp. 254–262. With 5 figs.

Yoffé (Hillel). Contribution à l'étude des fièvres exanthématiques.—*Rev. Méd. et Hyg. Trop.* 1933. Mar.–Apr. Vol. 25. No. 2. pp. 103–106.

REVIEWS AND NOTICES.

EDWARDS (F. W.). **Diptera. Fam. Culicidae.**—*Genera Insectorum.* Brussels. 1932. Fasc. 194. 258 pp. With 5 plates. [Refs.]

This is an important revision of the systematics of the mosquitoes of the world, of the greatest value as an authoritative list of the known species. The author recognizes 1,400 species, which he includes in 30 genera. The larvae of about half the species have been described (a far higher proportion than are known in any other group of insects). Among the Anophelini, the larvae of 125 of the 164 species have been described.

On questions of nomenclature the following points, among others, are of importance to the medical man. *Anopheles rooti*, Brèthes and *allopha*, Peryassú are regarded as *A. argyritarsis* ; *claviger*, Mg. is unfortunately correct for the species generally known as *bifurcatus* Mg. ; *mauritianus*, Grp. stands ; *ramsayi*, Covell (not *pseudojamesi*, Strick. and Choud.) It appears that *Aëdes variegatus*, Dol., distributed from the Andamans to Polynesia in various races, must be replaced by *scutellaris*, Wlk. (This is doubly unfortunate, for *A. albopictus*, Skuse, from S.E. Asia and N. Australia, has been frequently referred to as *scutellaris*, Theo.). The name of the Yellow Fever mosquito is *Aëdes aegypti*, L. *P. A. Buxton.*

EPSTEIN (G. V.). [**Pathogenic Protozoa, Spirochaetes and Fungi. Principles of General and Medical Protistology.**] Moscow–Leningrad (State Medical Publication) 1931. pp. viii + 920. With 5 plates & 517 text figs. [In Russian.] [Roubles 10.50.]

Although Russia, with its territory extending from arctic to subtropical regions, offers a wide and varied field for medical protistology, the development of this branch of parasitology has been slower than in other European countries, in spite of the fact that some of the important pioneer work was done by Russian parasitologists (*e.g.*, LÖSCH, SAKHAROFF, DANILEWSKY, BOROWSKY, etc.). During the last decade, in connexion with the efforts of the Soviet government to develop the natural resources of the country, and as a result of epidemic outbreaks of malaria and a considerable increase in the incidence of other diseases caused by protists, there arose an urgent demand for protistological investigations in human and veterinary medicine and in agriculture. An impetus was thus given to the study of protistology at the Universities ; protozoological departments were opened in a number of microbiological institutes ; and a network of malariological stations was established. Until quite recently, however, no Russian textbooks on protistology were available. Dr. Epstein's manual, designed mainly for medical men, is intended to supply this want. It deals with *Protista sensu lato*, the Special Part being divided equally between the Protozoa, on the one hand, and the Spirochaetes and Fungi, on the other. In the General Part, which occupies the first third of the book, an account is given of the morphology and physiology of these organisms ; questions of parasitism, infection and immunity in protists are also dealt with and a chapter is devoted to the general principles of chemotherapy. In the section on Protozoa only the pathogenic forms, as being of direct medical importance, are completely described. A detailed account is given of the amoebae, trypanosomes, leishmanias and plasmodia, and of the diseases they provoke. The unimportant human parasites, namely the intestinal flagellates, ciliates and coccidia, are briefly disposed of in the chapter on amoebae, while whole groups, such as Myxosporidia, Microsporidia and Sarcosporidia, are left out altogether. In the section on Spirochaetes Weil's disease, Relapsing Fever, Syphilis and Yaws are described in some detail. For historical reasons, Yellow Fever and and Dengue are also included in this section. The fungi and mycoses are treated in the same manner. On the whole, the book is written on conventional lines. The illustrations, including three coloured plates, are numerous and well

reproduced, in spite of the poor quality of the paper. The references are given at the end of each chapter, and there is an alphabetical index. To Russian medical workers and parasitologists, this text-book will serve as a reliable and up-to-date guide both in the laboratory and in the field.

The foreign reader will find in it useful information on the incidence and distribution of some of the protozoal diseases in Russia, of which the following is a summary :—Kala Azar occurs in Turkestan, in the zone between Tashkent, Termez, Ashkhabad and Samarkand ; Oriental Sore is endemic in Trans-Caucasia, the Trans-Caspian region and Turkestan. The distribution and incidence of malaria from 1887 to 1928 is illustrated by a series of tables and charts. The record figure before the war was reached in 1913, when more than 3½ million cases (21·6 per mille) were registered ; after this the incidence gradually fell to 650,000 in 1920, when it again began to increase, reaching the maximum of over six million (47·4 per mille) in 1923. The author believes that the official figure is underestimated, the actual number of cases being about 12 million. Before the war malaria was endemic in certain regions of Russia, but after the revolution, as a result of a northward migration of the population during the famine and also owing to the movements of the troops during the civil war it assumed pandemic proportions. By 1928 the incidence had subsided to about 3½ million (24·4 per mille), *i.e.*, to the maximum pre-war figure. The incidence of amoebic dysentery and of *Entamoeba histolytica* " carriers " [according to the author's view, the latter represent infections with *E. dispar* and *E. hartmanni*] will be recorded in a review of a more recent paper by the same author. *C. A. Hoare.*

Printed under the authority of His Majesty's Stationery Office
By the South Essex Recorders, Limited, High Road, Ilford.

(731) Wt. P1/101 1875 12/33 S.E.R. Ltd. Gp. 353.

INDEX OF AUTHORS OR SOURCES.

The bracketed abbreviations after the page numbers indicate the subjects. Page numbers within brackets indicate papers not summarized.

Am.	signifies	Amoebiasis and Amoebic Dysentery.
Bb.	,,	Beriberi and Epidemic Dropsy.
Bl.	,,	Blackwater.
B.R.	,,	Book Review.
Chl.	,,	Cholera.
C.Bu.	,,	Climatic Bubo and Lymphogranuloma Inguinale.
Der.	,,	Tropical Dermatology.
Dys.	,,	Dysentery (Bacillary and Unclassed).
Ent.	,,	Medical Entomology.
Fev.	,,	Fevers.
G.V.	,,	Granuloma Venereum.
Hel.	,,	Helminthiasis.
Hist.	,,	Historical.
H.S.	,,	Heat Stroke.
K.A.	,,	Kala Azar.
Lep.	signifies	Leprosy.
Lept.	,,	Leptospirosis.
Mal.	,,	Malaria.
Misc.	,,	Miscellaneous.
Myc.	,,	Tropical Mycology.
Oph.	,,	Tropical Ophthalmology.
Pel.	,,	Pellagra.
Pl.	,,	Plague.
Pro.	,,	Protozoology.
Rab.	,,	Rabies.
R.B.F.	,,	Rat-Bite Fever.
R.F.	,,	Relapsing Fever and other Spirochaetoses.
Sp.	,,	Sprue.
S.S.	,,	Sleeping Sickness.
Y.F.	,,	Yellow Fever.
Y. & S.	,,	Yaws & Syphilis.
Z.	,,	Medical Zoology.

A

Aalsmeer, W. C., 543 *bis* (Bb.)
—— & Richter, C. S., (160) (Bb.)
Abbatucci, S., (815) (Misc.)
Abondano, H. A., 446 (S.S.)
Abraham, A. C., 461 (Mal.)
Acanfora, G., (763) (Am.)
Achundow, I., 497 (Mal.)
Acosta Camps, L., with De la Cámara, (712) (Hel.)
Acton, H. W., (545) (Bb.)
—— & Chopra, R. N., 385 (Am.)
—— & Rao, S. S., 699 (Hel.)
Adams, A. R. D., 768 (S.S.)
Adant, M., 12 (R.F.), 558 (Lep.)
Adler, S. & Theodor, O., 318 (K.A.)
Advier, M., 525, 531 (Pl.), 541 (Bb.), 619 (Ent.)
—— & Diagne, A., 525 (Pl.)
——, with Mathis, 163 (Pl.)
Africa, C. M., 621 (Ent.)
Agapi, C., with Ciuca, Balteanu, Baillif, Irimesco, Alexa, Constantinesco, Jancou & Vieru, 62 (Mal.)
Aird, R., 635 (Misc.)
Aitken, A. B., 810 (Misc.)
Aizumi, H., with Haschimoto, Dendo & Furuno, (160) (Bb.)
Akamatsu, A., 211 (Hel.)
Akasawa, S., 367 *bis* (R.B.F.)
Akashi, K., 868 (Mal.)
Albot, G., with Merklen, Waitz & Kabaker, (389) (Am.)
de Alda, M., 91 (Mal.)
Aldershoff, H., 72 (Mal.)
d'Alessandria, E., (868) (Mal.)
Alessandrini, G., 734 (Pro.)
Alessandrini, M., (92) (Mal.)
Alexa, E., with Ciuca, Balteanu, Baillif, Irimesco, Constantinesco, Jancou, Agapi & Vieru, 62 (Mal.)
Alexa, I., with Slatineanu & Balteanu, 62 (Mal.)
Alexeieff, A., 22 (Am.)
Alexeieff, G., 206, 671 (Hel.)
Allard, with Lefrou, 252 (Misc.)
Allodi, A., (389) (Am.)
Alomia, A., (540) (Chl.)
Alonso Alonso, L., (92) (Mal.)
Alpers, B. J., with Riesman, Fox & Cooper, 579 (Rab.)
Altino de Araujo, E., with Parreiras, Ramos, Gonçalves, Barros, Lucena & de Oliveira, 153 (Bb.)
Ambrogio, A., 240 (Lep.)
Amelio, F., (711) (Hel.)
Amsterdam, Bureau for Increasing the Use of Quinine, (92) (Mal.)
Amtman, L. & Pilot, I., 126 (C.Bu.)
Ananiadès, B. & Antoniadès, C., 142 (Rab.)
Ancelot, A., with Launoy, 785 (S.S.)
Anderson, C., 318 (K.A.)
——, with Nicolle & Laigret, 10 (R.F.)
Anderson, D., 67 (Mal.), 305 (Ent.), 468 *bis* (Mal.)
Anderson, H. H. (28), 383 (Am.)
——, with Emerson & Leake, 240 (Lep.)
Anderson, J. W., with Williamson, Kimbrough & Dodson, 603 (G.V.)
Anderson, L. A. P., 182 (Z.)
——, with Martin, 910 (Fev.)
Anderson, T. F., (712) (Hel.)
—— & Roberts, M. A. W., 36 (Misc.)

André, J. H., with Kirk, 628 (Misc.)
Andrews, J., 387 (Am.)
—— & Atchley, F., 383 (Am.)
Andrews, M. N., (92) (Mal.), 727 (Pro.), 804 (Misc.)
——, with Gray, 384 (Am.)
Angelesco, J., with Combiesco, 891 (Fev.)
Angoloti, E., (92) (Mal.)
Anigstein, L., 68 (Mal.), 910 (Fev.)
Annales de Médecine et de Pharmacie Coloniales, (169) (Pl.)
Annecke, S., with Booker, (500) (Mal.)
Antoniadès, C., with Ananiadès, 142 (Rab.)
Antonino, N., (913) (Fev.)
Appelmans, M., with van den Branden, 48 (Misc.)
Apphatie, I. L. Y., 681 (Hel.)
Aragão, H. de B., 357, 716, (720) (Y.F.)
Arantes, J. B., 796 (S.S.)
Araujo, H. C. de S., (562) (Lep.)
Archer, G. T. L., 762 (Dys.)
Archer, J. G., (389) (Am.)
Archibald, R. G. & Marshall, A., 210 *bis*, 674 (Hel.)
Archives de l'Institut Pasteur d'Algérie, 472 (Mal.)
Archives des Instituts Pasteur d'Indochine, 39 (Misc.)
Archives de l'Institut Pasteur de Tunis, 38 (Misc.)
Arenas, N., (602) (C.Bu.)
Arenas, R., with Kouri, 210 (Hel.)
Argaud, R., 48 (Misc.)
Arnett, J. H., Wenrich, D. H. & Stabler, R. M., 758 (Am.)
v. Arnim, with Bromberger, 730 (Pro.)
Artigas, P. de T., with Campos, 796 (S.S.)
Arullani, C., (92) (Mal.)
Asami, S., with Ota, 239 (Lep.)
Aschoff, L., 547 (Pel.)
Ascione, G. & Mariotti, E., 487 (Mal.)
Ascoli, M. & Diliberto, U., (92) (Mal.)
Ashford, B. K., 245 (Sp.), (655) (Misc.)
—— & Snyder, H. M., 702 (Hel.)
Ashley, J. N., Browning, C. H., Cohen, J. B. & Gulbransen, R., 797 (S.S.)
de Asis, C., 180 (Z.)
Askins, R. A., 799 (Misc.)
de Assis, A., (913) (Fev.)
Atchley, F., with Andrews, 383 (Am.)
Atkey, O. P. H., 360 (R.F.)
Aubry & Dumolard, (500) (Mal.)
Audoye, with Marçon, 395 (Fev.)
Aujeszky, A., 585 (Rab.)
—— & Kerbler, F., 577 (Rab.)
Aulia & Cohen, A. J., with Sardjito & Mochtar, A., 17 (Lept.)
Aureli, B. W., with Tegoni, (96), (871) (Mal.)
Austin, C. J., 233 (Lep.)
d'Azevedo, A., with Brás de Sá & de Mello, 868 (Mal.)
——, with de Mello, 79, (501) (Mal.)
——, with —— & Brás de Sá, 79 (Mal.)
de Azevedo, A. P., 795 (S.S.)
de Azevedo, R., 186 (Y. & S.)
Azim, M. A., 205 (Hel.)
Azir, with Cohen, 156 (Bb.)
Azmy, S., Effat, S. & Neshoukati, H., 814 (Misc.)

B

Bablet, J., 876 (Fev.)
Bachman, G. W. & Rodriguez-Molina, R., 222 (Hel.)
Bachy, J., with Pascal, 326 (K.A.)
Bacigalupo, J., 211, (712) (Hel.)
Badenoch, A. G., 295 (Ent.)
—— & Byron, F. E., 241 (Lep.)
Badenski, G., with Jonesco-Mihaiesti, Tupa & Wismer, 128 (C.Bu.)
Badger, L. F., 894, 895 *bis*, 896 (Fev.)
——, with Dyer, Ceder & Workman, 875 (Fev.)
——, with ——, Workman & Rumreich, 405 (Fev.)
Baeza Cuéllar, M., (622) (Ent.)
Bagindo, Z. G. S., with Soesilo & Gilbert, 481 (Mal.)
Baillif, L., with Ciuca, Balteanu, Irimesco, Alexa, Constantinesco, Jancou, Agapi & Vieru, 62 (Mal.)
Bailly, J., with Remlinger, 137 *bis*, 140 *bis*, 141, 143, 578, 586 (Rab.)
——, with —— & Cabanie, (14) (R.F.)
Baily, J. D., with Covell, 64, 460 (Mal.)
Baker, J. N., (868) (Mal.)
—— & Gill, D. G., 480 (Mal.)
Ballif, L., with Ciuca & Vieru, 490 (Mal.)
Balozet, L., 136, 142, 585 (Rab.), 324 (K.A.)
Baltazard, M., with Blanc, Noury & Fischer, 890 (Fev.)
Balteanu, I., with Slatineanu & Alexa, 62 (Mal.)
Balteanu, J., with Ciuca, Baillif, Irimesco, Alexa, Constantinesco, Jancou, Agapi & Vieru, 62 (Mal.)
Banerjea, R., with Brahmachari, P. & Brahmachari, U., 102 (Bl.)
Banerjee, N. G. & Brahmachari, P., 520 (Bl.)
Banerji, K. M., with Sur & Sarkar, 85 (Mal.)
Barber, M. A., (92) (Mal.)
—— & Forbrich, L. R., 819 (Mal.)
Barlovatz, A., 443, 776, 782, 787 (S.S.)
Barlow, C. H., 674 (Hel.)
Barnsley, A., (53) (Misc.)
Baron, (92) (Mal.)
Barrada, Y., (550) (Pel.)
Barraud, P. J., (500) (Mal.)
Barrier, A. K., (92) (Mal.)
Barros, R. R., with Parreiras, Altino de Araujo, Ramos, Gonçalves, Lucena & de Oliveira, 153 (Bb.)
Barrowman, B., 493, 494 (Mal.)
Bartolucci, F., 68 (Mal.)
Barton, J. C., with Stone, Gaskill, Sanders, Schulz & Dawson, 849 (Mal.)
Basu, B. C., (869) (Mal.)
——, with Knowles, 737 (Pro.)
Battaglino, G., 584 (Rab.)
Bauer, J. H. & Kerr, J. A., (720) (Y.F.)
Baumann, H., with Schwetz, Peel & Droeshaut, (96), 821, 846, (870) (Mal.)
Baumgartner, E. A., 246 (Sp.)
Bauvallet, H., 710 (Hel.)
Beattie, J. M., with Choyce, 189 (B.R.)
Beattie, M. V. F., 293 (Ent.)
Bebeschin, K. W., with Smorodinzew & Pawlowa, (712) (Hel.)

Beck, D., with Porter & Stevens, 361 (R.F.)
Bedford, G. V., Williams, D. H. & Newton, M. V. B., 616 (Ent.)
Beeuwkes, H., Kerr, J. A., Weathersbee, A. A. & Taylor, A. W., 350 (Y.F.)
Beijnen, G. I. W. K., (53) (Misc.), (712) (Hel.)
Belmonte, D., 155 (Bb.)
Benarroch, E. I., 854 (Mal.)
Benbrook, E. A., 710 (Hel.)
Benchetrit, A., (562) (Lep.)
Benhamou, E., 75, 488 (Mal.)
—— & Nouchy, A., (500) (Mal.)
—— & Odry, (500) (Mal.)
Benjamins, C. E., 52 (Misc.)
Benoit, G., with Fourneau, Tréfouel, M. et Mme. & Bovet, 849 (Mal.)
Bensted, H. J., with Perry, 383 (Am.)
Bentmann, E., (92) (Mal.)
Berberian, D. A., with Turner & Dennis, 681 (Hel.)
Berge, with Vialard & Verliac, 562 (Lep.)
Bergmann, O., 673 (Hel.)
Bernard, P. N. & Guillerm, J., 537 (Chil.)
—— & Liang, W., 536 (Chl.)
Berny, with Laquieze, 781 *bis*, 782 (S.S.)
Berret & Nguyen-ba-Tung, M., (763) (Am.)
Berti, E., (53) (Misc.)
Bettencourt-Gomes, S. C., 521 (Bl.)
——, with Cochrane, 811 (Misc.)
Beunders, B. J. W. & van Thiel, P. H., 364 (R.F.)
Bevil, H. G., 479 (Mal.)
Bhaduri, 545 (Bb.)
Bhalerao, G. D., (712) (Hel.)
Bhattacharji, K. P., with Sur & Khan, (871) (Mal.)
Bhattacharyya, R., (655) (Misc.)
Biasiotti, M., 856 (Mal.)
Bifulco, C., 170, 536 (Chl.)
Biggam, A. G., 23 (Am.), 383 (Am.)
—— & Ghalioungui, P., 220 (Hel.)
Biggam, J., 398 (Fev.)
Bircher, M. E., with Bloch, 669 (Hel.)
Birk, W., 684 (Hel.)
Birkeland, I. W., 679 (Hel.)
Bishop, E. L., 825, (869) (Mal.)
——, with Fullerton, 825 (Mal.)
——, with Meleney & Leathers, 21 (Am.)
Bishopp, F. C., (622) (Ent.)
Black, K., 558 (Lep.), 630 (Misc.)
Blacklock, D. B., 59 (B.R.), 185, 597 (Y. & S.)
Blackman, N., with Kopeloff & McGinn, 87 (Mal.)
Blanc, G., Noury, M., Baltazard, M. & Fischer, M., 890 (Fev.)
——, —— & Fischer, M., 722, 906 (R.F.)
Bland, P. B., Goldstein, L., Wenrich, D. H. & Weiner, E., 729 (Pro.)
Bloch, A. & Bircher, M. E., 669 (Hel.)
Bloom, D. & Newman, B., (594) (Der.)
Blum, P., with Gougerot, 708 (Hel.)
Bode, H. G., 307, (622) (Ent.)
Boggs, T. R. & Padget, P., 146 (Pel.)
Bogojawlenski, N. A., 465 (Mal.)
Bombay, 636 (Misc.)
Boncinelli, U., 531 (Pl.)
——, with Reitano, (914) *bis* (Fev.)
——, with Ugo, 908 (Fev.)
Bonciu, C., with Combiesco, D., Stamatesco & Combiesco, N., 891 (Fev.)
Bonfa, A., (500) (Mal.)
Bonne, C., 216 (Hel.), 259 (Misc.), 591 *ter* (Der.)
Bonneau, E. & Farinaud, M. E., (92) (Mal.)
Booker, C. G. & Annecke, S., (500) (Mal.)
Boon van Ostade, C. H., (913) (Fev.)
Boquien, Y., with Laignel-Lavastine & Sterne, (18) (Lept.)
Borden, W. B., 470 (Mal.)
Borsotti, P. C., with Croveri, (594) (Der.)
Borzone, R. A., (244) (Lep.)
Bose, K., 65 (Mal.)
Bote, with Pereperez, Lara, Zozaya, Catañá, Torrademé, Collado & Pittaluga, 62, (95) (Mal.)
Bôto, R., 497 (Mal.)
Botreau-Roussel, M. & Huard, P., (763) *ter* (Am.)
Boucher, H., 488 (Mal.), 734 (Pro.)
Bouffard, 645 (Misc.)
Bouffard, G. & Vaucel, M., 763 (Dys.)
Bourguignon, with Valcke, 519 (Bl.)
Bourguignon, G. C., (93) (Mal.)
Bouyoucos, B., 859 (Mal.)
Bovet, D., with Fourneau, Tréfouel, M. et Mme. & Benoit, 849 (Mal.)
——, with ——, —— & Koetschet, 789 (S.S.).
Boyd, M. F., 303, 304 (Ent.)
—— & Cain, T. L., Jr., 304 (Ent.)
——, with Matheson & Stratman-Thomas, 488 (Mal.)
—— & Ponton, G., 464 (Mal.)
—— & Stratman-Thomas, W. K., 471 *ter*, 489, 852, 853 (Mal.)
Boyé, 2, 720 (Y.F.), 167 (Pl.), 317 (Ent.)
Bozicevich, J., with Wright, Underwood & Schaffer, 674 (Hel.)
Brac, G. F., with Falchetti, 323 (K.A.).
Bradley, B., 677 (Hel.)
Bradley, G. H., (93) (Mal.)
Brahmachari, P., Banerjea, R. & Brahmachari, U., 102 (Bl.)
——, with Banerjee, 520 (Bl.)
Brahmachari, U., 321 (K.A.)
——, with Brahmachari, P. & Banerjea, 102 (Bl.)
——, Majumder, A. R. & De, R. B., 321 (K.A.)
v. Brand, T., Regendanz, P. & Weise, W., 120 (S.S.)
Brants, J., 241 (Lep.)
Brás de Sá, L. J., with de Mello & d'Azevedo, 79, 868 (Mal.)
Brasil, V., Jr. & Leal, A. E., 584 (Rab.)
Braulke, H., 538 (Chl.)
Brazzaville, 778 (S.S.)
Breindl, V. & Jirovec, O., 87 (Mal.)
Brel, J., (93) (Mal.)
Brindley, P. & Howell, W. L., 588 (Der.)
British Empire Leprosy Relief Association, 551, 553 (Lep.)
British Museum (Natural History), 207 (Hel.)
Broc, R., 25 (Am.)
Bromberger & v. Arnim, 730 (Pro.)
Brosius, O. T., (93) (Mal.)
Brotzu, G., (500) *bis* (Mal.)
Brown, A. F., 453 (S.S.)

Brown, H. C., 830 (Mal.)
Brown, H. W., 204, 696 (Hel.)
——, with Lamson & Ward, 203 (Hel.)
Browne, D. C., 27 (Dys.)
Browne, W. T., (869) (Mal.)
Browning, C. H., with Ashley, Cohen & Gulbransen, 797 (S.S.)
Browning, C. H., Cohen, J. B., Cooper, K. E., Ellingworth, S. & Gulbransen, R., 797 (S.S.)
Brug, S. L. & de Rook, H., 697 (Hel.)
Brummelkamp, R., 809 (Misc.)
Brumpt, E., 888, 895, 899, 905 (Fev.)
Brumpt, L., with Erhardt, 678 (Hel.)
Brünauer, S. R., (712) (Hel.)
Bruynoghe, R. & Jadin, J., 889, 890 (Fev.)
Buchanan, G. S., 166 (Pl.)
de Buck, A., Schoute, E. & Swellengrebel, N. H., 70 (Mal.)
—— & Swellengrebel, N. H., 612 (Ent.)
——, with ——, 89 (Mal.), 613 (Ent.)
——, Torren, G. V. D. & Swellengrebel, N. H., 612 (Ent.)
Buckley, J. J. C., 693 (Hel.)
de Buen, E., with De la Camara, Fernandez Martinez & Juarez, 10 (R.F.)
——, —— & Juarez, E., (712) (Hel.)
Bulletin Office International d'Hygiène Publique, 359 (Y.F.)
von Bülow, T., 185 (Y. & S.)
Burbi, L., 368 (R.B.F.)
Burman, C. E. L., (93) (Mal.)
Burnett, W. A., 543 (Bb.)
Bustillo, V., (93) *bis* (Mal.)
Buxton, P. A., 291, 292, 316 (Ent.)
Byam, W., (815) (Misc.)
Byron, F. E., with Badenoch, 241 (Lep.)

C

Cabanie, with Remlinger & Bailly, (14) (R.F.)
Cabassu, H., with Giraud, 323, 754 (K.A.)
Caffé, L. & Fulga, C., 127 (C.Bu.)
Cain, T. L., Jr., with Boyd, 304 (Ent.)
Calcutta, 141 (Rab.), 570 (B.R.)
Calcutta Medical Journal, 544 *bis* (Bb.)
Callinicos, G., with Stefanopoulo, 8, 353 (Y.F.)
Callol, F. G. & Flo, M. P., (602) (C.Bu.)
Caminopetros, J., 17, (18) (Lept.), 402 (Fev.)
—— & Contos, B., 905, 906, 907 (Fev.)
——, Pheloukis, T. & Contos, B., 907 (Fev.)
Campos, E. de S. & Artigas, P. de T., 796 (S.S.)
Canicio Garcia, I., with Cartañá Castellá & Fabrega Huga, (869) (Mal.)
Cannavò, L., 14 (R.F.), (28) (Am.)
Cantacuzène, J. & Longhin, S., 239 (Lep.)
Capurro, J. D., with Fernandez & Carri, (231) (Hel.)
Cardera, (93) (Mal.)
Carley, P. S., 471 (Mal.)
Carpenter, J. A., with Ramsay, (501) (Mal.)
Carri, M. A., with Fernández & Capurro, (231) (Hel.)
Cartañá, with Pereperez, Lara, Bote, Zozaya, Torrademé, Collado & Pittaluga, 62, (95) (Mal.)
Cartañá Castellá, P., Canicio Garcia, I. & Fabrega Huga, J., (869) (Mal.)
Cartia, G., (756) (K.A.)
Casas, U., with Diaz Florez, Garcia de Cosa & Ortega, (869) (Mal.)
Castaneda, M. R., with Zinsser, 400, 887 (Fev.)
Castellani, A., 53, (53), 642 (Misc.), 76 (Mal.), 762 (Dys.)
Castex, M. R. & Greenway, D., 691 (Hel.)
Castronuovo, G., (602) (C.Bu.)
Catanei, A., 589, 590 (Der.)
——, with Sergent, Et., 85, 491 (Mal.)
——, with —— & Senevet, (96) (Mal.)
——, with ——, Trensz, F. & Sergent, A., 299 (Ent.)
Cattan, R., with Troisier, 907 (Fev.)
Cattoir, E., with Lavillat, 326 (K.A.)
Cawston, F. G., (261) (Misc.), 675, (712) (Hel.)
Cazanove, F. & Robert, L., 9 (Y.F.)
Ceder, E. T., with Dyer, Badger & Workman, 875 (Fev.)
Chacón, A. L., (231) (Hel.)
Chagas, E., 795 (S.S.)
Chahed, (93) (Mal.)
Chamberlain, W. P., 631 (Misc.)
Chambon, 707 (Hel.), 781 (S.S.)
Chan, E. & Yang, N. K., 534 (Chl.)
Chandler, A. C., 223 (Hel.)
Chandra, S. N., with Lloyd, 700 (Hel.)
Charpentier, with Hilleret, 154 (Bb.)
Charron, E., 850 (Mal.)
Charters, A. D., 98 (Bl.)
Chatron, M., 678 (Hel.)
Chatterjee, K., 320 (K.A.)
Chatterjee, S. N., with Muir, 755 (K.A.)
Chatterjee, S. R., 477 (Mal.)
Chatton, E., (124) (S.S.)
Chaudhuri, H. P., with Strickland & Roy, 458 (Mal.)
Chavarría, P., with Rotter, 589, 591 (Der.)
Chen, K. F., with Yu, 172 (Chl.)
Chen, W. K., 175 (Chl.)
Chesterman, C. C., 32 (Misc.)
Ch'in, K. Y., with Hu, 455 (S.S.)
Chinese Medical Journal, (93) (Mal.)
Chi-Shen, L., 215 (Hel.)
Chitwood, B. G., 710 (Hel.)
Chiyuto, S., 241, 560 (Lep.)
Chopra, R. N., 42 (Misc.), 262 (B.R.), 477 (Mal.)
——, with Acton, 385 (Am.)
—— & Chowhan, J. S., 181 (Z.)
——, Dikshit, B. B. & Chowhan, J. S., 42 (Misc.)
——, Gupta, B. M. D. & Sen, B., 474, 844 (Mal.)
—— & Mukherjee, B., 41, 42 (Misc.)
Chorine, V., 87, 475, 485 *bis*, 488, 845 (Mal.), 723 (R.F.), 735 (Pro.)
—— & Gillier, R., 854 (Mal.)
——, with Marchoux, 562 (Lep.), 850 (Mal.)
——, with —— & Leroy, 487 (Mal.)
Chowdhury, K. L., with Strickland, 835 (Mal.)
Chowhan, J. S., with Chopra, 181 (Z.)
——, with —— & Dikshit, 42 (Misc.)
Choyce, C. C. & Beattie, J. M., 189 (B.R.)
Christian, C. R., 399 (Fev.)
Cilento, R. W., 249, 803 (Misc.)

Ciuca, M., Ballif, L. & Vieru, M. C., 490 (Mal.)
——, Balteanu, J., Baillif, L., Irimesco, G., Alexa, E., Constantinesco, N., Jancou, J., Agapi, C. & Vieru, M., 62 (Mal.)
Clark, H. C., with Dunn, 361 (R.F.)
—— & Komp, W. H. W., (93), 862 (Mal.)
Clarkson, L. M., 825, (869) (Mal.)
Clemesha, W. W., 861 (Mal.)
van Cleve, J. V., with de Wolf, 125 (C.Bu.)
Clunie, T., 50 (Misc.)
Cochrane, E., (655) (Misc.)
—— & Bettencourt-Gomes, S. C., 811 (Misc.)
Cochrane, R. E., 243 (Lep.)
Coghlan, B. A., 779 (S.S.)
Cohen, A. J., with Aulia, Sardjito & Mochtar, 17 (Lept.)
—— & Azir, 156 (Bb.)
Cohen, J. B., with Ashley, Browning & Gulbransen, 797 (S.S.)
——, with Browning, Cooper, Ellingworth & Gulbransen, 797 (S.S.)
Cohn, A. & Kleeberg, L., 601 (C.Bu.)
Coia, A. G., 653 (Misc.)
Colas-Belcour, J., with Roubaud & Gaschen, 305 (Ent.)
Collado, G., with Pereperez, Lara, Bote, Zozaya, Cartañá, Torrademé & Pittaluga, 62, (95) (Mal.)
Collari, S., 648 (Misc.), (869) (Mal.)
Collier, W. A. & Seegert, J., 790 (S.S.)
Colombani, 526 (Pl.)
Combiesco, D., 902 (Fev.)
—— & Angelesco, J., 891 (Fev.)
——, Bonciu, C., Stamatesco, S. & Combiesco, N., 891 (Fev.)
—— & Zotta, G., 904, 905 (Fev.)
Combiesco, N., with Combiesco, D., Bonciu & Stamatesco, 891 (Fev.)
Connor, F., 647 (Misc.)
Connor, J. I., 589 (Der.)
Connor, R. C., 61 (Mal.)
Constantacato, G., with Liviérato & Vagliano, 857 (Mal.)
Constantinesco, N., with Ciuca, Balteanu, Baillif, Irimesco, Alexa, Jancou, Agapi & Vieru, 62 (Mal.)
Constantinesco, V., with Nicolau & Mathis, 136 (Rab.)
Contos, B., with Caminopetros, 905, 906, 907 (Fev.)
——, with Pheloukis & Caminopetros, 907 (Fev.)
Conzemius, 555 (Lep.)
Cook, S. S., (93) (Mal.)
Coonoor, Pasteur Institute of Southern India, 584 (Rab.)
Cooper, D. A., with Riesman, Fox & Alpers, 579 (Rab.)
Cooper, G. F., with Fetherston, 137 (Rab.)
Cooper, K. E., with Browning, Cohen, Ellingworth & Gulbransen, 797 (S.S.)
Copanaris, P., 15 (Lept.)
Coppleson, V., (815) (Misc.)
Corbia, A., (93) (Mal.)
Cordes, W. & De la Torre, T., (93) (Mal.)
Corkill, N. L. & Scander, D., 593 (Der.)
Cornelson, D. A., with Mezincescu & Peter, 822 (Mal.)
Corner, J. D., 89 (Mal.)
Corradetti, A., 482 (Mal.)
Corson, J. F., 439 (S.S.)
Cort, W. W., 219 (Hel.)
——, with Foster, 221 (Hel.)
—— & Otto, G. F., 683 (Hel.)
Cortés, A. P., 319 (K.A.)
Costa, M. H., 578 (Rab.)
da Costa, S. F. G., with Rebello & Rico, 682 (Hel.)
Coudray, F. E. C., 639 (Misc.)
Coulter, J. L. S., 806 (Misc.)
Couput, A., with Montel, 596 (Y. & S.)
Coussa, M., 324 (K.A.)
Coutelen, F., with Hoare, 778 (S.S.)
Couture, E., with Rochaix & Sédallian, 403 (Fev.)
Covell, G., 63, 64, (500) (Mal.)
—— & Baily, J. D., 64, 460 (Mal.)
Covell, W. P. & Danks, W. B. C., 135 (Rab.)
Cowdry, E. V., 718 (Y.F.)
Cowgill, G. R., 156 (Bb.)
Craig, C. F., 20 *bis*, 387, (389), 760 (Am.), (93) (Mal.)
—— & Kagy, E., 760 (Am.)
Craighead, A. C., with Cunningham & Malone, 581 (Rab.)
Crawford, D. J. M., with Palner, 721 (R.F.)
Crawford, R., 495 (Mal.)
Cropper, C. F. J. & Mitra, J., 24 (Am.)
Croveri, P. & Borsotti, P. C., (594) (Der.)
Crutcher, J. S., Jr., 901 (Fev.)
Cruveilhier, L., with Nicolau & Kopciowska, 143 (Rab.)
Cruz, J. da C. & Villela, G. G., 356 (Y.F.)
—— & Vianna, A., 542 (Bb.)
Cruz, W. O., 218, (712) (Hel.)
Cuboni, E., (545) (Bb.)
Cullen, J. P., (408) (Fev.)
Culpin, M., 802 (Misc.)
Cunningham, J., Malone, R. H. & Craighead, A. C., 581 (Rab.)
Cutler, J. T., 672 (Hel.)

D

Daengsvang, S., with Prommas, 711 (Hel.)
Dalal, N. P., with Row & Gollerkeri, 492 (Mal.)
Dale, H., 76 (Mal.)
van Dam, W., with Vedder, 173 *ter* (Chl.)
Dang-Teh-Trinh, with Monier, 737 (Pro.)
Danks, W. B. C., with Covell, 135 (Rab.)
Dareys, with Robert, Long & Feyte, 541 (Bb.)
——, with —— & Pluchon, 474 (Mal.)
Das, G., with Gupta & Majumdar, (501) (Mal.)
Dau, H., with Pijper, 909 (Fev.)
Davey, T. H. & Gordon, R. M., 466 (Mal.)
——, with ——, 469, 482 (Mal.)
——, with ——, Hicks & Watson, 301 (Ent.)
David, J., (869) (Mal.)
David, J. C. & Vareed, C., 815 (Misc.)
David, N. A. & Johnstone, H. G., 220 (Hel.)
——, with —— & Reed, 757 (Am.)
——, —— & Stanley, L. L., 386 (Am.)
Davis, F. A., 378 (Oph.)

Davis, G. E., with Parker, 893, 894 (Fev.)
Davis, N. C., 5, 353 (Y.F.)
——, Lloyd, W. & Frobisher, M., Jr., 355 (Y.F.)
——, with Soper, Frobisher, Jr. & Kerr, 3 (Y.F.)
Dawson, W. T., (93), (869) (Mal.)
——, with Sanders, (501) (Mal.)
——, —— & Tomlinson, L. M., (500) (Mal.)
——, with Stone, Gaskill, Sanders, Barton & Schulze, 849 (Mal.)
Day, H. B., 208 (Hel.)
De, 545 (Bb.)
De, M. N., 43 (Misc.)
De, R. B., with Brahmachari & Majumder, 321 (K.A.)
Defazio, F., with Niño, (712) *bis* (Hel.)
De la Cámara, P. & Acosta Camps, L., (712) (Hel.)
——, with de Buen & Juarez, (712) (Hel.)
——, Fernandez Martinez, J., de Buen, E. & Juarez, E., 10 (R.F.)
Delacoux des Roseaux, (869) (Mal.)
Delanoë, E., 48 (Misc.)
Delanoë, P., 163 (Pl.), 365 (R.F.)
De la Torre, F., (169) (Pl.)
——, with Cordes, (93) (Mal.)
Del Campo Cardona, A. & Pita Gandarias, E., (869) (Mal.)
Del Favero, E., 539 (Chl.)
Della Casa, V., 220 (Hel.)
Del Ponte, E., with Zuccarini, 719 (Y.F.)
Del Val, J., (53) (Misc.)
Dendo, K., with Haschimoto, Aizumi & Furuno, (160) (Bb.)
Dennis, E. W., with Turner & Berberian, 681 (Hel.)
Derbigny, I. A., with Sherman, 549 (Pel.)
Deschiens, R., 728 (Pro.), 758 (Am.)
Des Essarts, J. Q., 758 (Am.)
—— & Prade, J. V., 880 (Fev.)
Dévé, F., 212 *quat*, 213 *bis*, 682 (Hel.)
Dhayagude, R., 386 (Am.)
Diagne, A., with Advier, 525 (Pl.)
Dias, E., 123 *bis*, 796, 797 (S.S.)
Diaz Florez, A., Garcia de Cosa, C., Casas, U. & Ortega, D., (869) (Mal.)
Dikshit, B. B., with Chopra & Chowhan, 42 (Misc.)
Diliberto, U., 46 (Misc.)
——, with Ascoli, (92) (Mal.)
Dinger, J. E., (9) (Y.F.), 16, 372 (Lept.), 911 (Fev.)
Dixon, H. B. F., 846 (Mal.)
Djaparidse, P. S., 71, (500) (Mal.), 307 (Ent.)
Do Amaral, Z., 53 (Misc.)
Dodson, A. I., with Williamson, Anderson & Kimbrough, 603 (G. V.)
Doerr, R. & Menzi, E., 696 (Hel.)
Doggart, J. H., 375 (Oph.)
Dolfini, G., 586 (Rab.)
Dombrowsky, K. H., with Kuhn, 38 (Misc.)
Donat, F., with Kofoid, 457 *bis*, 794 (S.S.)
Donatien, A., Lestoquard, F. & Parrot, L., 325 (K.A.)
Donóvan, R. E., (500) (Mal.)
Dortmann, H., 446 (S.S.)
Dougherty, M. S., Jr., 758 (Am.)
Dove, W. E., Hall, D. G. & Hull, J. B., 614 (Ent.)
——, with —— & ——, 615 (Ent.)
Droeshaut, with Schwetz, Baumann & Peel, 821, 846, (870) (Mal.)
——, with ——, Peel & Baumann, (96) (Mal.)
Dubois, A., 47, (815) (Misc.), 232 *ter* (Lep.), 363 (R.F.), 444, 445, 785 (S.S.), 842 (Mal.)
——, with Rodhain & Hendrix, 788 (S.S.)
—— & Ury, J., 556 (Lep.)
——, with Van den Branden, 444 (S.S.)
Dufour, V., 519 (Bl.)
Duke, H. L., 104, 433, 438, 452, 453, 454, 769, 770 *bis* (S.S.)
Dumolard, with Aubry, (500) (Mal.)
Dumont, P., with Van den Branden, 116 (S.S.)
Duncan, D., 843 (Mal.)
Dunn, L. H., 120 (S.S.), 292, 317 (Ent.)
—— & Clark, H. C., 361 (R.F.)
Duran, A., with Kraus, 133 (Rab.)
Durand, P., 400, 891, 906 (Fev.)
Durieux, C., 3, 350 (Y.F.)
——, with Mathis, 14 (R.F.)
Dutt, 545 (Bb.)
Dyer, R. E., 894, 896 (Fev.)
——, Badger, L. F., Ceder, E. T. & Workman, W. G., 875 (Fev.)
——, Workman, W. G. & Rumreich, A., 876 (Fev.)
——, ——, —— & Badger, L. F., 405 (Fev.)
Dyleff, P., 436 (S.S.)

E

Earle, W. C., 496 (Mal.)
—— & Perez, M., 74 (Mal.)
Eckhardt, A., 80 (Mal.)
Economic Advisory Council, 436 (S.S.)
Edwards, F. W., 915 (B.R.)
Effat, S., with Azmy & Neshoukati, 814 (Misc.)
Egypt, 669 (Hel.)
Ehuchi, C., with Iguchi, Ohotsubo, Sugina, Kanno, Nagatsuka, Okuaki, Kashiwagi, Oshima, Hachiya, Misaka & Ohsuka, 27 (Dys.)
Eisenman, A. J., with Wakeman, Morrell, Sprunt & Peters, 520 (Bl.)
Ejercito, A., (869) (Mal.)
Elford, W. J., with Hindle, 723 (R.F.)
Ellingworth, S., with Browning, Cohen, Cooper & Gulbransen, 797 (S.S.)
Ellis, D., 811 (Misc.)
Elmes, B. G. T., (53) (Misc.)
Elsbach, L., 676 (Hel.)
Emanuel, J., (712) (Hel.)
Emerson, G., Anderson, H. H. & Leake, C. D., 240 (Lep.)
Engelhardt, W., 307 (Ent.)
Enzer, J., 36 (Misc.)
Epstein, D., 41 (Misc.), 184 (Z.), 868 (Mal.)
Epstein, G. V., 915 (B.R.)
Epstein, S., (816) (Misc.)
Epstein, S. I. & Fjodorowa, T. W., 226 (Hel.)
Erhardt, A., 211, 678 (Hel.)
—— & Brumpt, L., 678 (Hel.)
—— & Keil, W., 211 (Hel.)

Escalar, G., 866 (Mal.)
——, with Pecori, 498, (870) (Mal.)
Eskey, C. R., 161 (Pl.)
Esler, A. R., 643 (Misc.)
Espinel Sabogal, S., with Zozaya, 858 (Mal.)
Eufinger, H., Rothermundt, M. & Wiesbader, H., 119 (S.S.)

F

Fabiani, G., (244) (Lep.)
Fabrega Huga, J., with Cartañá Castellá & Canicio Garcia, (869) (Mal.)
Fabri, G., 752 (K.A.)
Fabry, 541 (Bb.)
Fairbairn, H., 765, 767 (S.S.), (816) (Misc.)
——, with Maclean, 108 (S.S.)
Fairley, H., (764) (Am.)
Fairley, N. H., 254, 653 (Misc.), 835 (Mal.)
Fakhry, A., 147, (550) (Pel.)
Falchetti, E., 323 (K.A.)
—— & Brac, G. F., 323 (K.A.)
Fallon, M., with Radl, 245 (Sp.)
Fallon, W. M., 220 (Hel.)
Fan, C., with Liu & Wang, 539 (Chl.)
Fanjul, L., 653 (Misc.)
Farinaud, M., 821 (Mal.)
Farinaud, M. E., with Bonneau, (92) (Mal.)
Farjot, 486 (Mal.), 726 (Pro.)
Fastowskaja, E. I., with Gorodezky, 82 (Mal.)
Fatome, (869) (Mal.)
Faure-Brac, with d'Oelsnitz, 754 (K.A.)
Faust, E. C., (93), (869) (Mal.)
——, with Hinman, 317 (Ent.)
—— & Kagy, E. S., 694 (Hel.)
——, with Meleney & Riley, 825 (Mal.)
Fawcus, H. B., 632 (Misc.)
Federated Malay States, 68 (Mal.), 637 (Misc.)
Fejer, J., 379 (Oph.)
Feldman, W. M., 657 (B.R.)
Feldt, A., 10 (R.F.)
Felix, A., 884 (Fev.)
Feng, L., 698 (Hel.), 736 (Pro.)
Feng, L.-C., 69 (Mal.)
——, with Hoeppli, 620 (Ent.)
Fermi, C., 824 (Mal.)
Fernández, J. G., Carri, M. A. & Capurro, J. D., (231) (Hel.)
Fernandez Martinez, F. & Suarez Peregrin, E., (816) (Misc.)
Fernandez Martinez, J., with De la Camara, P., de Buen, E. & Juarez, E., 10 (R.F.)
Fetherston, J. E. & Cooper, G. F., 137 (Rab.)
Feyte, with Robert, Long & Dareys, 541 (Bb.)
Feyte, R., 99 (Bl.)
Fialho, A., 391 (Fev.)
Fidel Fernandez, M., 225 (Hel.)
Figueira, L. & Landeiro, F., 497 (Mal.)
Findlay, G. M., 407, 912, 913 (Fev.), 717 (Y.F.)
Fine, J., 457 (S.S.)
Finkelstein, M. H., (655) (Misc.)
Fischer, M., with Blanc & Noury, 722 (R.F.), 906 (Fev.)
——, with ——, —— & Baltazard, 890 (Fev.)
Fischer, O., 844 (Mal.)
—— & Günsberger, O. D., 499 (Mal.)
Fischl, V., 38 (Misc.)
Fisher, L. C., with Reimann & Ulrich, 397 (Fev.)
Fitzgerald, G. H., (594) (Der.), 648 (Misc.)
Fjodorowa, T. W., with Epstein, 226 (Hel.)
Flandrin, with Lemaire, Thiodet & Laget, (501) (Mal.)
Fleming, A. M. & Hennessey, R. S. F., 593 (Der.)
Fletcher, W., 399 (Fev.)
——, with Stanton, 327 (B.R.)
Flinker, R., 548 (Pel.)
Flo, M. P., with Callol, (602) (C.Bu.)
Fonquernie, J., 166 (Pl.)
Fons, O., with Garcia de Cosa, (93) (Mal.)
da Fonseca, F., 322 *bis* (K.A.)
——, with Monteiro, 892, 893 *bis*, (913) (Fev.)
Forbrich, L. R., with Barber, 819 (Mal.)
Ford, N., 310 (Ent.)
Forster, E., 684 (Hel.)
Foster, A. O., 221 (Hel.)
—— & Cort, W. W., 221 (Hel.)
Fourie, L., 161 (Pl.)
Fourneau, E., Tréfouel, J., M. et Mme., Bovet, D. & Benoit, G., 849 (Mal.)
——, ——, —— & Koetschet, P., 789 (S.S.)
Fourrier, J., with Schewebel, (326) (K.A.)
Fox, W. W., with Riesman, Alpers & Cooper, 579 (Rab.)
Franchini, G., 326 (K.A.), 657 (B.R.)
—— & Taddia, L., 736 (Pro.)
Franchini, J., (738) (Pro.)
Franco, E., 319 (K.A.)
Frei, W., 129, 599 (C.Bu.)
——, Wiese, J. & Klestadt, F., 602 (C.Bu.)
Fréville, 524 (Pl.)
Fribourg-Blanc, A., with Le Bourdellès, 856 (Mal.)
Fridman, G., with Tzechnowitzer, Moldavskaya-Kritchevakaya & Gorchowa, 892 (Fev.)
Friedlander, R. D., with McCoy & Miller, Jr. 694 (Hel.)
Friel, R., (913) (Fev.)
Frobisher, M., Jr., 9 (Y.F.)
——, with Davis & Lloyd, 355 (Y.F.)
——, with Kumm, 5 (Y.F.)
——, with Soper, Kerr & Davis, 3 (Y.F.)
Froés, H. P., (19) (R.B.F.), 654, 804 (Misc.), 229 *bis*, (231)
Fröhlich, H., 187 (Y. & S.)
Frye, W. W. & Meleney, H. E., 382 (Am.)
——, with ——, 387, 757 (Am.)
Fuentes, L., (540) *bis* (Chl.)
Fulga, C., with Caffé, 127 (C.Bu.)
Fülleborn, 218 (Hel.)
Fülleborn, F., 223, 687 (Hel.)
Fullerton, H. R. & Bishop, E. L., 825 (Mal.)
Furuno, M., with Haschimoto, Aizumi & Dendo, (160) (Bb.)
Fuss, S. & Hanser, R., 621 (Ent.)

G

Gabriel, J., 71 (Mal.)
Gabrielidès, C. A., 377 (Oph.)

Gaehtgens, W., 724 (Lept.)
Gaglio, V., (28) (Am.)
Gaide & Niel, 23 (Am.)
Gajdos, S. & Tchang, J., 876 (Fev.)
Galliard, H., 461, (869) (Mal.), 617 (Ent.), 708 (Hel.), 730 *bis* (Pro.)
Ganguli, P., 845 (Mal.)
Garcia, O., 596 (Y. & S.)
Garcia de Cosa, C., 475 (Mal.)
——, with Diaz Florez, Casas & Ortega, (869) (Mal.)
—— & Fons, O., (93) (Mal.)
Gardiner, M. L., with Miller, H. M. Jr., 682 (Hel.)
Garin, C., Rousset, J. & Gonthier, B., 262 (B.R.)
Garnett, M. & Sturton, S. D., (389) (Am.)
Garnham, P. C. C., 733, 735 (Pro.)
Garrison, C. W., (869) (Mal.)
Gaschen, H., 619 (Ent.)
——, with Roubaud, 611 (Ent.)
——, with —— & Colas-Belcour, 305 (Ent.)
——, with —— & Toumanoff, 610 (Ent.)
Gaskill, R. C., with Stone, Sanders, Barton, Schulze & Dawson, 849 (Mal.)
Gass, R. S., with Keller & Hillstrom, 217 (Hel.)
Gasser, R. R., 397 (Fev.)
Gater, B. A. R., 607 (Ent.)
Gauguet, 407 (Fev.), (816) (Misc.)
Gautschi, with d'Oelsnitz, 756 (K.A.)
Geill, T., 246 (Sp.)
Genoese, G., (93) (Mal.)
Germain, A., with Plazy, (95) (Mal.)
Gertson, G. D., Lancaster, W. E. G., Larson, G. A. & Wheeler, G. C., 616 (Ent.)
Gessner, H. B., (763) (Am.)
Ghalioungui, P., with Biggam, 220 (Hel.)
Ghosal, J. N., (603) (G.V.)
Ghosh, 545 (Bb.)
Ghosh, A. B., 385 (Am.)
Ghosh, B. N., 818 (B.R.)
Ghosh, H., 538 (Chl.)
Giardina, A., 753 (K.A.)
Gibbins, E. G., 67 (Mal.), 608 (Ent.)
Gibson, C. C. G., with Walker, 753 (K.A.)
Giemsa, G., 848 (Mal.)
Giglioli, G., 52 (Misc.), 75, 464, 499 (Mal.), 97, 101, 517 (Bl.), 228 (Hel.)
Gilbert, A. P. W., with Soesilo & Bagindo, 481 (Mal.)
Gilks, J. L., (816) (Misc.)
Gill, D. G., with Baker, 480 (Mal.)
Gillier, R., with Chorine, 854 (Mal.)
Gillison, K., with Skinner, (29) (Am.)
Gimeno Ondovilla, A., 752, 753 (K.A.)
Ginsburg, J. M., 45 (Misc.)
Gioseffi, M., (94) (Mal.)
Giovannola, A., with Jerace, 860 (Mal.)
Girard, G., (763) (Am.)
Giraud, G., 526 (Pl.)
Giraud, P. & Cabassu, H., 323, 754 (K.A.)
Girges, R., 676 (Hel.)
Giroud, P., with Nicolle & Laigret, 880, 883 (Fev.)
Giuffrè, L., (94) (Mal.)
Giunta, G., (712) (Hel.)
Glowazky, F., with John, (869) (Mal.)
Gnanadickam, G. J., 376 (Oph.)
Gnedina, M. P., with Podjapolskaja, 216 (Hel.)
Goette, (261) (Misc.)
Gohar, M. A., 171 *bis* (Chl.)
Goldstein, L., with Bland, Wenrich & Weiner, 729 (Pro.)
Gollerkeri, G. V., with Row & Dalal, 492 (Mal.)
Gomes, L. S., 402 (Fev.)
Gonçalves, B., with Parreiras, Altino de Araujo, Ramos, Barros, Lucena & de Oliveira, 153 (Bb.)
Gontaewa, A. A., with Tareev, 487 (Mal.)
Gonthier, B., with Garin & Rousset, 262 (B.R.)
Gonzalez, S. & Toscano, J. M., 756 (K.A.)
Goodhart, G., 254 (Misc.)
Goodson, J. A. & Henry, T. A., (94) (Mal.)
Gopsill, L. W., 208 (Hel.)
Gorchowa, E. L., with Tzechnowitzer & Moldavskaya-Kritchewskaya, 483 (Mal.)
——, with ——, —— & Fridman, 892 (Fev.)
Gordon, R. M. & Davey, T. H., 469, 482 (Mal.)
——, with ——, 466 (Mal.)
——, Hicks, E. P., Davey, T. H. & Watson, M., 301 (Ent.)
Gorodezky, A. S. & Fastowskaja, E. I., 82 (Mal.)
Gottlieb, F., 129, 130 (C.Bu.)
——, with Liebreich, 130 (C.Bu.)
Gougerot & Blum, P., 708 (Hel.)
Goyle, A. N. & Gupta, P. N. S., 172 (Chl.)
Grace, A. W., Grace, F. B. & Warren, S., 228 (Hel.)
Grace, F. B., with Grace, A. W. & Warren, 228 (Hel.)
Grady, E., with Sandels, 151 (Pel.)
Graham, 167 (Pl.)
Grant, A. M. B., 627 (Misc.)
Grantham-Hill, C., (655) (Misc.)
Gratch, I., (500) (Mal.)
Gray, J. & Andrews, M. N., 384 (Am.)
Greaves, A. V., 384 (Am.)
Green, R., 489 (Mal.), (501) *bis* (Mal.)
Greenway, D., with Castex, 691 (Hel.)
Greig, E. D., 440 (S.S.)
Greig, E. D. W., 707 (Hel.)
Gremeau, R. P., 124 (S.S.)
Grenierboley, J. & Nay-Huoth, (869) (Mal.)
Greval, S. D. S., 142, 580 *bis*, 585 (Rab.)
Griffin, M. F. N., (28) (Am.)
Grillo, J., 810 (Misc.)
Grippain, P., 127 (C.Bu.)
Gritzay, P. K., with Moldawskaja-Kritschewskaja & Uman, 855 (Mal.)
Groothoff, A. & Henry, T. A., 847 (Mal.)
Grossmann, J., with Jelin, 890 (Fev.)
Grünfeld, A. A., with Serebrennaja & Neumann, (914) (Fev.)
Guasch, J. & Llaurado, A., 319 (K.A.)
Guelmino, D., (501) (Mal.)
Guerricchio, A., (913) (Fev.)
Guillerm, J., with Bernard, 537 (Chl.)
Gulbransen, R., with Ashley, Browning & Cohen, 797 (S.S.)
——, with Browning, Cohen, Cooper & Ellingworth, 797 (S.S.)
Gunewardene, H. O., 691 (Hel.)

Günsberger, O. D., with Fischer, 499 (Mal.)
Gupta, A., 554 (Lep.)
Gupta, B. M. D., 100 (Bl.), 763 (Dys.)
——, with Chopra & Sen, 474, 844 (Mal.)
——, with Knowles, 73 (Mal.)
Gupta, C. C. D., 519 (Bl.)
Gupta, N., 257 (Misc.)
Gupta, P., Das, G. & Majumdar, N. R., (501) (Mal.)
Gupta, P. N. S., with Goyle, 172 (Chl.)
Gupta, S. K., with Pasricha & de Monte, 174 (Chl.)
Guyomar'ch, 107 (S.S.)

H

Haagen, E., 357 (Y.F.)
—— & Theiler, M., 8 (Y.F.)
Hackett, L. W., with Missiroli & Martini, 833 (Mal.)
Hachiya, T., with Iguchi, Ohotsubo, Sugina, Kanno, Nagatsuka, Okuaki, Kashiwagi, Oshima, Ehuchi, Misaka & Ohsuka, 27 (Dys.)
Hajare, S. S., 579 (Rab.)
Hakki, A. & Muhtar, A., 475 (Mal.)
Halawani, A. E., 728 (Pro.)
Hale, C., 62 (Mal.)
Hall, D. G., Jr., 309 (Ent.)
Hall, D. G., with Dove & Hull, 614 (Ent.)
—— Hull, J. B. & Dove, W. E., 615 (Ent.)
Hall, M. C., 203, 670 (Hel.)
Hall, W. W. & Vogelsang, W. A., 179 (Z.)
Halperin, E. P., 793 (S.S.)
——, with Kritschewski, 860 (Mal.)
Hamilton, T. D., with Harvey, 254 (Misc.)
Hamlyn-Harris, R., 298 (Ent.)
Hanafin, P. J., 862 (Mal.)
Hanneborg, O., 736 (Pro.)
Hanser, R., with Fuss, 621 (Ent.)
Hanson, H., (869) (Mal.)
Harazawa, J., with Watanabe, 558 (Lep.)
Hargrove, M. D., (763) (Am.)
Harley, G. W., 635 (Misc.)
Harmegnies, 31 (Misc.)
Harper, P., 220 (Hel.)
Harris, P. N., 900 (Fev.)
Harrison, C. C. & Ramsay, G. C., 459 (Mal.)
Harvey, W. F. & Hamilton, T. D., 254 (Misc.)
Haschimoto, T., Aizumi, H., Dendo, K. & Furuno, M., (160) (Bb.)
Hase, A., 180 (Z.), 315 (Ent.)
Haslé, G., 807 (Misc.)
——, with Normet, 644 (Misc.)
Hassan, A., 675, 676 (Hel.)
Hassard, E. N., 592 (Der.)
Hasselmann-Kahlert, M., (816) (Misc.)
Hasskó, A., 11, 363 (R.F.)
Havens, L. C. & Mayfield, C. R., 580 (Rab.)
Hawking, F., with Yorke, 111 (S.S.)
——, with —— & Murgatroyd, 794 (S.S.)
——, with —— & Murgatroyd, 447 *bis*, 448 *bis* (S.S.)
Hayne, T. B., with Kerr, 5 (Y.F.)
Hayward, E. W., 755 (K.A.)
Heathman, L., 25 (Am.)
——, with Sherwood, 25 (Am.)
Hecht, O., 604, 605, (622) (Ent.)
Heckenroth, F. & Raynal, J., 654 (Misc.)
Hegler, C., 370 (Lept.)
Hegner, R., 21 (Am.), 728 (Pro.), (869) (Mal.)
van Hell, J. C., 821 (Mal.)
Heller, M., 695 (Hel.)
Hendrix, H., with Rodhain & Dubois, 788 (S.S.)
Hennessey, R. S. F., with Fleming, 593 (Der.)
Henning, M. W., 656 (B.R.)
Henrard, C., with van Hoof, 773 (S.S.)
Henry, A., (869) (Mal.)
Henry, A. F. X., 485 (Mal.)
Henry, E., with Rodhain, 116 (S.S.)
Henry, T. A., 76 (Mal.)
——, with Goodson, (94) (Mal.)
——, with Groothoff, 847 (Mal.)
Hepple, R. A., 399 (Fev.)
d'Herelle, F., 73 (Mal.)
Herholz, with Jacobi, (94) (Mal.)
Hérivaux, A., Rakotoson, J. & Ranoarivony, E., (28) (Am.)
Hermitte, L. C. D., 50 (Misc.)
van Heutsz, J. B., 243 (Lep.)
Hewer, T. F., 44 (Misc.)
Hewitt, J. A., 735 (Pro.)
Hicks, E. P., 226 (Hel.)
——, with Gordon, Davey & Watson, 301 (Ent.)
Hilbert, D. N., with Plantureux, 138 (Rab.)
Hill, R. B. & Olavarria, J., (94) (Mal.)
Hillenbrand, K., 42 (Misc.)
Hilleret & Charpentier, 154 (Bb.)
Hillstrom, H. T., with Keller & Gass, 217 (Hel.)
Hindle, E. & Elford, W. J., 723 (R.F.)
Hinman, E. H., 604 (Ent.)
—— & Faust, E. C., 317 (Ent.)
Hiroki, H., 12 *bis* (R.F.)
Hirst, L. F., 522, 529 (Pl.)
Hissette, J., 377, 378 (Oph.), 441 (S.S.), 709 (Hel.)
Hiyeda, K., (28), (763) (Am.)
—— & Suzuki, M., 20 (Am.), 669 (Hel.)
Hoakai, V. V. H., (501) (Mal.)
Hoare, C. A. & Coutelen, F., 778 (S.S.)
Hodgkin, E. P. & Rajamoney, P. D., 834 (Mal.)
Hoeppli, R., 676 (Hel.)
—— & Feng, L. C., 620 (Ent.)
Hoffman, F. L., (94) (Mal.)
Hoffman, W. A., 292 (Ent.), 711 (Hel.)
Hoffmann, C. C., (94) (Mal.)
Hoffmann, J. M., Mertens, W. K. & Snijders, E. P., 407 (Fev.)
Hoffmann, W. H., 352 (Y.F.)
Holl, G., (28) (Am.)
Holland, E. A., 866 (Mal.)
Holt, R. L. & Russell, P. F., 462 (Mal.)
——, with ——, (95) (Mal.)
Hood, A., (28) (Am.), (94) (Mal.)
van Hoof, L. & Henrard, C., 773 (S.S.)
Hoops, A. L., 476, 843 (Mal.)
Horrenberger, R., 326 (K.A.)
Hoskins, W. M., 294 (Ent.)
Hosoya, S., Terao, S. & Takata, S., 762 (Dys.)
Howell, W. L., with Brindley, 588 (Der.)
Hu, C. H. & Ch'in, K. Y., 455 (S.S.)

Huard, 49 (Misc.)
Huard, P., 808 *bis* (Misc.)
——, with Botreau-Roussel, (763) *ter* (Am.)
Hudson, E. H. & Young, A. L., 691 (Hel.)
Hughes, T. P. & Sawyer, W. A., 2 (Y.F.)
Huisman, R. G. J. P., (53), (816) (Misc.)
Hull, J. B., with Dove & Hall, 614 (Ent.)
——, with Hall & Dove, 615 (Ent.)
Hulsey, S., with Wilson & Weidman, 590 (Der.)
Humphreys, R. M., 207 (Hel.)
Hung, S., 678 (Hel.)
Huri, M., 173, 176 (Chl.), 592 (Der.)
Hutchison, R., (764) (Am.)

I

Iguchi, J., Ohotsubo, I., Sugina, T., Kanno, J., Nagatsuka, T., Okuaki, G., Kashiwagi, S., Oshima, K., Ehuchi, C., Hachiya, T., Misaka, O. & Ohsuka, T., 27 (Dys.)
—— & Otsubo, G., 27 (Dys.)
Imagawa, Y., with Kawamura & Ito, 911 (Fev.)
India, 835 (Mal.)
Iredell, A. W., 495 (Mal.)
Irimesco, G., with Ciuca, Balteanu, Baillif, Alexa, Constantinesco, Jancou, Agapi & Vieru, 62 (Mal.)
Ishak, W., 651 (Misc.)
Ishioka, H., with Miyahara, 82 (Mal.)
——, with Morishita & Miyahara, 81 (Mal.)
Ismail, A. S., 147 (Pel.)
Ito, T., with Kawamura & Imagawa, 911 (Fev.)
Ito, Y., 181 (Z.), (655) (Misc.)
Iyengar, K. R. K., 584 (Rab.)
Iyengar, M. O. T., 66, 458 (Mal.), 227, 699 (Hel.)
——, with Rao, 227 (Hel.)
Izar, G., 22 (Am.)

J

Jacobi, E. & Herholz, (94) (Mal.)
Jacocks, W. P., 798 (Misc.)
Jadin, J., with Bruynoghe, 889, 890 (Fev.)
——, with Laigret, 883 (Fev.)
Jafar, M., 67 (Mal.)
——, with Wats, 27 (Dys.)
James, A. J., 142 (Rab.)
James, C., 644 (Misc.)
James, S. P., 76 (Mal.)
——, Nicol, W. D. & Shute, P. G., 74 (Mal.), 733 (Pro.)
James, W. M., 62 (Mal.)
Jameson, G. D., 620 (Ent.)
Jancou, J., with Ciuca, Balteanu, Baillif, Irimesco, Alexa, Constantinesco, Agapi & Vieru, 62 (Mal.)
von Jancsó, N., 124 (S.S.)
Jan-Kerguistel, A., 533 (Pl.)
Jantzen, W., with Phelps, (95) (Mal.)
Jardon, M., with Trensz, 452 (S.S.)
Jarvis, O. D., 81, 475 (Mal.)
Jelin, W. & Grossmann, J., 890 (Fev.)
Jellison, W. L., with Parker & Philip, 899 (Fev.)
Jemma, R., 75 (Mal.)
Jerace, F. & Giovannola, A., 860 (Mal.)
Jersild, O., 600 (C.Bu.)
de Jesus, P. I., 608 (Ent.)
Jettmar, H. M., 169 (Pl.), 649 (Misc.)
Jewell, N. P., 209 (Hel.)
Jirovec, O., with Breindl, 87 (Mal.)
Jobling, B., 314 (Ent.)
Johannessohn, F., 264 (B.R.)
John, H. & Glowazky, F., (869) (Mal.)
Johnson, P. D., 440 (S.S.)
Johnson, W. B., 1 (Y.F.)
Johnson, W. S., (870) (Mal.)
Johnstone, H. G., with David, 220 (Hel.)
——, —— & Reed, A. C., 757 (Am.)
——, with —— & Stanley, 386 (Am.)
—— & Larsen, A. E., 709 (Hel.)
——, with Reed, A. C., (29) (Am.)
Jolley, P. G. E., 477 (Mal.)
Jonesco-Mihaiesti, Tupa, A., Wismer, B. & Badenski, G., 128 (C. Bu.)
Jonnesco, D., 136 *ter*, 142 (Rab.)
Jorge, R., 526, 529 (Pl.), 874 (Fev.)
Joseph, G., (169) (Pl.), 719 (Y.F.)
Journal of Parasitology, 207, 670 (Hel.)
Journal of the Public Health Association of Japan, 464 (Mal.), 585 (Rab.)
Joyeux, C. & Piéri, J., 907 (Fev.)
Juarez, E., with de Buen & De la Camara, (712) (Hel.)
—— with De la Camara, Fernandez Martinez & de Buen, 10 (R.F.)
Jude & Millischer, 535 (Chl.)
Jude, L. V. R., Martin, L. H. D. H. & Millischer, P., 170 (Chl.)
Jude, R. & Millischer, P., 175 (Chl.)
Junge, W., 863 (Mal.)
Jurgens, A. L., 229 (Hel.)
Jussiant, 619 (Ent.)

K

Kabaker, J., with Merklen, Waitz & Albot, (389) (Am.)
Kagan, N. W., with Kritschewski, 370 (Lept.)
Kagy, E., with Craig, 760 (Am.)
Kagy, E. S., with Faust, 694 (Hel.)
Kalandadse, L., 297 (Ent.)
—— & Mtschedlidse, J., 865 (Mal.)
Kalz, F., 601 (C. Bu.)
Kanno, J., with Iguchi, Ohotsubo, Sugina, Nagatsuka, Okuaki, Kashiwagi, Oshima, Ehuchi, Hachiya, Misaka & Ohsuka, 27 (Dys.)
Kappus, A., 88 (Mal.)
Karamchandani, P. V., (94), 847 (Mal.)
Karczag, L., (29) (Am.)
Karout, T. & Moldavskaya-Kritchevskaya, V., 892 (Fev.)
Kasauli, Pasteur Institute of: 583 (Rab.)
Kashiwagi, S., with Iguchi, Ohotsubo, Sugina, Kanno, Nagatsuka, Okuaki, Oshima, Ehuchi, Hachiya, Misaka & Ohsuka, 27 (Dys.)
Kassirskiy, J. A., 33 (Misc.)
Kataropulo, A., 24 (Am.)

Katayama, N., 731 (Pro.)
Kaufmann, E., (655) (Misc.)
Kawamura, R., Imagawa, Y. & Ito, T., 911 (Fev.)
Kawanishi, K., 214, 219, (231) (Hel.)
Kawasaki, S., with Sumi, 217 (Hel.)
Käyser, J. D., 642 (Misc.)
Kehar, N. D., 65 (Mal.)
Keil, W., with Erhardt, 211 (Hel.)
Keller, A. E., 684 (Hel.)
——, Hillstrom, H. T. & Gass, R. S., 217 (Hel.)
Kellersberger, E. R., 434 (S.S.)
Kemp, H. A., 887 (Fev.)
Kerbler, F., with Aujeszky, 577 (Rab.)
Kerr, J. A., 4 (Y.F.)
——, with Bauer, (720) (Y.F.)
——, with Beeuwkes, Weathersbee & Taylor, 350 (Y.F.)
—— & Hayne, T. B., 5 (Y.F.)
——, with Soper, Frobisher, Jr. & Davis, 3 (Y.F.)
Kessel, J. F. & Rose, E. J., 762 (Dys.)
Khan, B. M., with Sur & Bhattacharji, (871) (Mal.)
Khouri, J., (712) (Hel.), (816) (Misc.)
Kiefer, E. D., 25 (Am.)
Kikuth, W., 80 *bis*, (94), 480 (Mal.), 572, 818 (B.R.)
Kilner, T. P., 642 (Misc.)
Kimbrough, R., with Williamson, Anderson & Dodson, 603 (G.V.)
King, H. H., 140 (Rab.)
Kingsbury, A. N., 637 (Misc.)
Kirk, J. B. & André, J. H., 628 (Misc.)
Kirschner, L., 15 (Lept.)
Kirwan, E. W. O'G., 376, 377 (Oph.)
Kitabatake, E., 728 (Pro.)
Kitamura, K. & Takada, I., (231) (Hel.)
Kitchen, S. F., with Sawyer & Lloyd, 6 (Y.F.)
Kittredge, H. E., 589 (Der.)
Kleeberg, L., with Cohn, 601 (C.Bu.)
Klein, S. A., (29) (Am.)
Kleine, F. K. & Krause, M., 11 (R.F.)
Klerks, J. V., with Radsma & Streef, 35 (Misc.)
Klestadt, F., with Frei & Wiese, 602 (C.Bu.)
Kligler, I. J. & Mer, G., 834 (Mal.)
——, —— & Olitzki, L., 468 (Mal.)
Knabe, K., 229 (Hel.)
Knight, H. W., (533) (Pl.)
Knott, J. I. & Rice, J. B., (712) (Hel.)
Knowles, R. & Basu, B. C., 737 (Pro.)
—— & Gupta, B. M. D., 73 (Mal.)
Koch, D. A. & Reed, A. C., 25 (Am.)
Kodama, M., 391, 878 (Fev.)
—— & Kono, M., 888 (Fev.)
—— & Takahashi, K., 889 (Fev.)
Kodama, T., with Shoda, Koreyeda, Okamoto & Otomo, 534 (Chl.)
Koetschet, P., with Fourneau, Trefouel, M. et Mme. & Bovet, 789 (S.S.)
Kofoid, C. A. & Donat, F., 457 *bis*, 794 (S.S.)
Kolochine, C., with Martin-Charpenel & Mathis, 8 (Y.F.)
Komada, K., with Tanabe, 736 (Pro.)
Komp, W. H. W., (870) (Mal.)
——, with Clark, (93), 862 (Mal.)
Konné, M., with Pieraerts, 115 (S.S.)
Kono, M., with Kodama, 888 (Fev.)
Konstansoff, S. W., 532 (Pl.)
Kopciowska, L., & Nicolau, 138 (Rab.)
——, with ——, 576 (Rab.)
——, with —— & Cruveilhier, 143 (Rab.)
Kopeloff, N., Blackman, N. & McGinn, B., 87 (Mal.)
Kopstein, F., 164 *bis*, 165, 523 (Pl.)
Koressios, N. T., 851 (Mal.)
Koreyeda, T., with Shoda, Kodama, Okamoto & Otomo, 534 (Chl.)
Korke, V. T., 228 (Hel.)
Korobkova, E., (176) (Chl.)
Korteweg, P. C., 473 (Mal.)
Korthof, G., 17 (Lept.)
Kouri, P. & Arenas, R., 210 (Hel.)
Kouwenaar, W., 46, (816) (Misc.)
——, with Snijders, Maasland & Wolff, 49 (Misc.)
——, —— & Wolff, J. W., 393 (Fev.)
—— & Wolff, J. W., 912 (Fev.)
——, with ——, 394 (Fev.)
Krantz, W., 365 (R.F.)
Kranzfeld, A. M., 572 (B.R.)
Kraus, R. & Duran, A., 133 *bis* (Rab.)
Krause, M., with Kleine, 11 (R.F.)
Krauss, W., (94) (Mal.)
Kreis, H. A., 224 (Hel.)
Krikorian, K. S., with Stuart, 139, 586 (Rab.)
Kritschewski, I. L. & Halperin, E. P., 860 (Mal.)
—— & Kagan, N. W., 370 (Lept.)
—— & Meerson, J. S., (94) (Mal.)
—— & Rubinstein, P. L., (94) (Mal.)
Kudo, T., (94) (Mal.)
Kuhn, P. & Dombrowsky, K. H., 38 (Misc.)
Kumm, H. W., 6 (Y.F.)
—— & Frobisher, M., Jr., 5 (Y.F.)
Kundu, M. L., 399 (Fev.)
Kunstein, E., 16 (Lept.)
Kupffer, A., 233 (Lep.)
Kuroya, M. & Oshio, K., 534 (Chl.)
Kwaschnina, A., (816) (Misc.)
Kyu, K., (389) (Am.)

L

Labuschagne, P. N. H., 863 (Mal.)
Lacour, P., with Meersseman, 486 (Mal.)
Lacquet, A. M., (53) (Misc.)
Laget, with Lemaire, Thiodet & Flandrin, (501) (Mal.)
Lagrosa, M., 557 (Lep.)
——, with Lara, 557 (Lep.)
Laignel-Lavastine, Boquien, Y. & Sterne, J., (18) (Lept.)
Laigret, J., 242 (Lep.), 353, 715, 716 (Y.F.)
—— & Jadin, J., 883 (Fev.)
——, with Nicolle, 878, 880, 881, 882 *bis* (Fev.)
——, with —— & Anderson, 10 (R.F.)
——, with —— & Giroud, 880, 883 (Fev.)
——, with ——, Marcandier & Pirot, 397 (Fev.)
——, with —— & Sicard, 721 (R.F.)
——, with Sellards, 6, 359 (Y.F.)

Lal, S., 815 (Misc.)
Lalazarov, G., with Novikova, 163 (Pl.)
Lall, J. & Singh, J., 474 (Mal.)
Lallemant, G. F. M. A., with Soerono & Soesilo, 70 (Mal.)
Lama, A., (29) (Am.)
Lambert, L., 541 (Bb.)
Lambert, S. M., 248, 798 (Misc.), 691 (Hel.)
Lamborn, W. A., 177 (Z.)
Lambrichts, (94) (Mal.)
Lampe, P. H. J., 555 (Lep.)
Lamson, P. D., Brown, H. W. & Ward, C. B., 203 (Hel.)
Lancaster, W. E. G., with Gertson, Larson & Wheeler, 616 (Ent.)
Lancet, 478 (Mal.)
Landeiro, F., with Figueira, 497 (Mal.)
Lane, C., 55 (B.R.), 687, 703 (Hel.)
de Langen, C. D., 686 (Hel.), 812 (Misc.), 829 (Mal.)
Lapage, G., 683 (Hel.)
Laqueur, B., 755 (K.A.)
Laquieze & Berny, 781 *bis*, 782 (S.S.)
Lara, C. B., 236, 237 (Lep.)
—— & Lagrosa, M., 557 (Lep.)
—— & Samson, J. G., 242 (Lep.)
Lara, G., with Pereperez, Bote, Zozaya, Cartañá, Torrademé, Collado & Pittaluga, (95), 62 (Mal.)
Larsen, A. E., with Johnstone, 709 (Hel.)
Larson, G. A., with Gertson, Lancaster & Wheeler, 616 (Ent.)
Lasnet, A. & Sergent, Ed., (94) (Mal.)
Lassablière, P., with Tanon & Peycelon, 788 *bis* (S.S.)
Latham, D. V., 629 (Misc.)
Launoy, L., 114, 445, 784 (S.S.)
—— & Ancelot, A., 785 (S.S.)
Laurel, A. G., with Urbino, 303 (Ent.)
Laurell, A., (913) (Fev.)
Laurent, R., 442 (S.S.)
Lauzeral, P. & Millischer, P., (169) (Pl.)
Lavier, G., 793 (S.S.)
Lavillat, F. & Cattoir, E., 326 (K.A.)
Lawrence-Smith, A. M., (29) (Am.)
Lawton, F. B. & Murray, A., 879 (Fev.)
Leach, C. W., with Roberts, 479 (Mal.)
League of Nations. Health Organisation, 477 (Mal.)
League of Nations Monthly Epidemiological Report, 1 (Y.F.)
League of Nations, Quarterly Bulletin Health Organisation, 563 (Misc.), 837 (Mal.)
Leake, C. D., with Emerson & Anderson, 240 (Lep.)
Leal, A. E., with Brasil, V., Jr., 584 (Rab.)
Leathers, W. S., with Meleney & Bishop, 21 (Am.)
Le Bourdellès, B., 855 (Mal.)
—— & Fribourg-Blanc, A., 856 (Mal.)
Le Chuiton, F. & Moureau, M., 403, 877 (Fev.)
——, with ——, 725 (R.B.F.)
LeDoux, H. A., with Thonnard-Neumann, (96) (Mal.)
Lee, C. U., 676 (Hel.)
Lee, H. B., (261) (Misc.)
Lee, S. W., 385 (Am.)
Lee, S. W. T., 104 (S.S.)
Lefèbvre, (870) (Mal.)
Lefèvre, (816) (Misc.)
Le Forestier, R., 243 (Lep.)
Le Forze Sanitarie, 473 (Mal.)
Lefrou, G., 4 (Y.F.)
—— & Allard, 252 (Misc.)
Legendre, F., 166 (Pl.), (870) *bis* (Mal.)
Leger, M., 385 (Am.), 478 (Mal.)
—— & Queinnec, P., 230 (Hel.)
Legge, R. T., 721 (R.F.)
Leisermann, L. I., 490 (Mal.)
Leiva, L., 176 (Chl.)
Lemaire, G., 873 (Fev.)
——, Thiodet, Laget & Flandrin, (501) (Mal.)
Le Moult & Pirot, R., 215 (Hel.)
Lenfeld, J., 326 (K.A.)
Lepeuple, (816) (Misc.)
Lépine, P., 396, 404, 883 (Fev.)
—— & Markianos, J., 239 (Lep.)
——, —— & Papayoannou, A., 559 (Lep.)
LePrince, J. A., (94) (Mal.)
Leprosy in India, 232, 552 *bis* (Lep.)
Leprosy Review, 234, 551 (Lep.)
Leroy, R., with Marchoux & Chorine, 487 (Mal.)
Lester, H. M. O., 430, 431, 451 (S.S.)
Lestoquard, F., with Donatien & Parrot, 325 (K.A.)
Levaditi, C., 134 (Rab.)
—— & Mezger, J. G., 575 (Rab.)
——, Ravaut, P., Schoen, R. & Levaditi, J., 601 (C.Bu.)
——, ——, —— & Vaisman, A., 128 (C.Bu.)
——, ——, Vaisman, A. & Schoen, R., 602 (C.Bu.)
——, Schoen, R. & Mezger, J. G., 134 *ter*, 575 (Rab.)
Levaditi, J., with Levaditi, C., Ravaut & Schoen, 601 (C.Bu.)
——, with ——, —— & ——, 601 (C.Bu.)
Liang, W., with Bernard, 536 (Chl.)
Lichtenstein, A., (94) (Mal.)
Liebreich, E. & Gottlieb, F., 130 (C.Bu.)
Liengme, A., 697 (Hel.)
Lieou, with Souchard, Marneffe & Vielle, 400 (Fev.)
Lightwood, R., 254 (Misc.)
Lignos, A., 321 (K.A.)
Lima, C., 401 (Fev.)
Lindberg, K., (94) *bis* (Mal.)
Lindeman, S. J. L., 910 (Fev.)
Lindén, O., 40 (Misc.)
Lindsay, K., 802 (Misc.)
Ling, C., (540) (Chl.)
Linton, R. W. & Shrivastava, D. L., 539 (Chl.)
Lio, G., 851 (Mal.)
Liria Borderas, A. & Turégano, J. F. M., (501) (Mal.)
Lissner, L., 18 (Lept.)
Litterer, W., 900 (Fev.)
Liu, S. H., Wang, S. H. & Fan, C., 539 (Chl.)
Liviérato, S., Vagliano, M. & Constantacato, G., 857 (Mal.)
Livingston, P. C., 378 (Oph.)
Llaurado, A., with Guasch, 319 (K.A.)
Lloyd, L., 797 (S.S.)
Lloyd, R. B. & Chandra, S. N., 700 (Hel.)

Lloyd, W., with Davis & Frobisher, Jr., 355 (Y.F.)
—— & Penna, H. A., 354, 714, 718, (Y.F.)
——, with Sawyer & Kitchen, 6 (Y.F.)
Lo Bianco, D., (913) (Fev.)
Lodato, G., (95) (Mal.)
Loewenthal, L. J. A., 37 *bis* (Misc.)
Löffler, E. & Schweinburg, F., 138, 140 (Rab.)
Logie, H. B., 329 (B.R.)
Löhe, H. & Rosenfeld, H., 127 (C.Bu.)
Long, with Robert, Feyte & Dareys, 541 (Bb.).
Longhin, S., with Cantacuzène, 239 (Lep.)
Lorando, N. J., (14) (R. F.), 408 (Fev.)
Lörincz, F., 726 (Pro.)
——, with v. Szentkirályi, 615 (Ent.)
di Lotti, V. K., 326 (K.A.)
Low, G. C. & Manson-Bahr, P. H., 703 (Hel.)
Lowe, J., with Muir, 553 (Lep.)
Lu, T. H., (533) (Pl.)
de Luca, B., 473 (Mal.)
Lucena, J., with Parreiras, Altino de Araujo, Ramos, Gonçalves, Barros & de Oliveira, 153 (Bb.)
Lucker, J. T., 670 (Hel.)
Lüdtke, H., (712) (Hel.)
Luján, M. & Rotter, W., 125 (C.Bu.)
Lutz, K., 126 (C.Bu.)
Lwoff, A., 738 (Pro.)

M

Maass, with Wichels, 827 (Mal.)
Maasland, J. H., with Snijders, Kouwenaar & Wolff, 49 (Misc.)
MacArthur, W. P., 636 (Misc.), 680 (Hel.)
McAusland, S., 817 (B.R.)
McCarthy, L., 694 (Hel.)
McCay, F. H., 388 (Dys.)
Macchiavello Varas, A., 162 (Pl.)
McCoy, O. R., 225, 706 (Hel.)
——, Miller, J. J. & Friedlander, R. D., 694 (Hel.).
McCulloch, W. C., 103 (Bl.)
McDaniel, J. C., (95) (Mal.)
McGinn, B., with Kopeloff & Blackman, 87 (Mal.)
McGinnes, G. F., (870) (Mal.)
MacGregor, M. E., 306, (317) (Ent.)
McGroarty, B. J., with Schneider, 581 (Rab.)
McKay, W. J. S., (622) (Ent.)
McKendrick, A. G., 138, 582 (Rab.)
McKenzie, A., 43 (Misc.)
Mackerras, I. M., 706 (Hel.)
Mackie, T. T., 23, (Am.), 26 (Dys.) 259 (Misc.)
McKinley, E. B., with Soule, 238 (Lep.)
—— & Verder, E., 559 (Lep.)
MacLean, G. & Fairbairn, H., 108 (S.S.)
McLean, N., 643 (Misc.)
MacLeod, N. C., 97 (Bl.)
McMullen, 803 (Misc.)
McQueen, W. B., (870) (Mal.)
McSwan, D. M., 407 (Fev.)
MacVicar, N., (261) (Misc.)
Madrid, 573 (B.R.)
Magheru, A., with Magheru, G. & Mihailescu, (540) (Chl.)
Magheru, G., Magheru, A. & Mihailescu, G., (540) (Chl.)
Magness, W. H., with Ramsdell, 549 (Pel.)
Mahadevan, V. & Menon, T. B., 680 (Hel.)
Maitra, G. C. & Mallick, S. M. K., 183 (Z.)
Majanz, A. I., 677 (Hel.)
Majid, A., with Mulligan, 65 (Mal.)
Majid, S. A., 854 (Mal.)
Majumdar, N. R., with Gupta & Das, (501) (Mal.)
Majumder, A. R., with Brahmachari & De, 321 (K.A.)
Maki, H., 153 *bis* (Bb.)
Malaret, P. S., 260 (Misc.)
Malaria-Commissie uit den Gezondheidsraad, 72 (Mal.)
Malinine, I., with Pechkovsky, 238 *bis* (Lep.)
Mallick, S. M. K., with Maitra, 183 (Z.)
Malone, R. H., with Cunningham & Craighead, 581 (Rab.)
Manalang, C., 235 *ter*, 240, 241, 562 *bis* (Lep.)
Mangiacapra, A., (95) (Mal.)
Mansell, R. A. (501) (Mal.)
Manson, D. & Ramsay, G. C., 64, 820 (Mal.)
Manson-Bahr, P. H., 22, (764) (Am.), 76 (Mal.), 518 (Bl.), 809 (Misc.)
——, with Low, 703 (Hel.)
Manwell, R. D., 735 (Pro.)
Manzuoli, J., 761 (Dys.)
Maplestone, P. A., 203, 693 (Hel.)
—— & Mukerji, A. K., 205 (Hel.)
Marais, I. P., with Neitz, 576 (Rab.)
Marcandier, with Nicolle, Laigret & Pirot, 397 (Fev.)
—— & Pirot, R., 639 (Misc.), 877 *bis*, 889 (Fev.)
——, Plazy & Pirot, R., 904 (Fev.)
Marchiafava, R. A., (501) (Mal.)
Marchoux, E. & Chorine, V., 562 (Lep.), 850 (Mal.)
——, Leroy, R. & Chorine, V., 487 (Mal.)
Marcialis, I., 326 (K.A.)
Marçon & Audoye, 395 (Fev.)
Marie, A. C., 579 (Rab.)
Marinesco, G. & Stroesco, G., 135 (Rab.)
Mariotti, E., with Ascione, 487 (Mal.)
Markianos, J., with Lépine, 239 (Lep.)
——, with —— & Papayoannou, 559 (Lep.)
Marmo, A., (764) (Am.)
Marneffe, with Souchard, Lieou & Vielle, 400 (Fev.)
Marotta, G. & Peratoner, U., (870) (Mal.)
de Marqueissac, 104, 109, 110 (S.S.), 252 (Misc.)
—— & Sohier, H., 554 (Lep.)
Marshall, A., with Archibald, 210 *bis*, 674 (Hel.)
Marshall, J. F. & Staley, J., 297 (Ent.)
Martin, C. de C. & Anderson, L. A. P., 910 (Fev.)
Martin, L. H. D. H., with Jude & Millischer, 170 (Chl.)
Martin-Charpenel, G., Mathis, M. & Kolochine, C., 8 (Y.F.)
Martinez González, M., (712) (Hel.)
Martini, E., 73, (501) (Mal.), 571 (B.R.)
——, with Missiroli & Hackett, 833 (Mal.)
—— & Teubner, E., 609, (622) (Ent.)
Mason, M., 329 (B.R.)
Massa, M., (550) (Pel.), 845 (Mal.)
Massias, C., 478, 850 (Mal.)

Materna, (95) *bis* (Mal.)
Maternowska, I., with Trawiński, 695 (Hel.)
Matheson, R., 327 (B.R.)
——, Boyd, M. F. & Stratman-Thomas, W. K., 488 (Mal.)
Mathewossjan, S. T. & Zaturjan, A. T., 754 (K.A.)
Mathis, C. & Advier, M., 163 (Pl.)
—— & Durieux, C., 14 (R.F.)
——, with Nicolau & Constantinesco, 136 (Rab.)
Mathis, M., 356 (Y.F.)
——, with Martin-Charpenel & Kolochine, 8 (Y.F.)
Matsumoto, T. & Motoura, F., (95) (Mal.)
Mattei, (95) (Mal.), (367) (R.F.)
Mattei, A., (28) (Am.)
Mattera, A., 384 (Am.)
Mattlet, G., 596 (Y. & S.), (816) (Misc.)
Maurice, G. K., 360 (R.F.)
May, W. J., 476 (Mal.)
Mayeozoko, S., 702 (Hel.)
Mayfield, C. R., with Havens, 580 (Rab.)
Mayne, B., 85, (95), 825, 852 (Mal.)
Mazza, S., 324 (K.A.), 351 (Y.F.)
Mazzolani, D. A. (913) (Fev.)
Meagher, J. L., (501) (Mal.)
Medical Parasitology and Parasitic Diseases, Moscow, 472 (Mal.)
Meerson, J. S., with Kritschewski, (94) (Mal.)
Meersseman, F. & Lacour, P., 486 (Mal.)
Megaw, J., 873 (Fev.)
Meijers, F. M., 657 (B.R.)
Meiklejohn, A. P., Passmore, R. & Peters, R. A., (53) (Misc.)
de Meillon, B., 608 (Ent.)
van Meirhaeghe, A., with Thiry, 16 (Lept.)
Melanidis, C., with Petzetakis & Tzortzakis, 18 (Lept.)
Meleney, H. E., Bishop, E. L. & Leathers, W. S., 21 (Am.)
——, Faust, E. C. & Riley, G. E., 825 (Mal.)
—— & Frye, W. W., 387, 757 (Am.)
——, with ——, 382 (Am.)
Mellanby, K., 316 (Ent.)
de Mello, F., (816) (Misc.)
—— & de Azevedo, A., 79, (501) (Mal.)
——, Brás de Sá, L. J. & de Azevedo, A., 79, 868 (Mal.)
Menendez, P. E., 26 (Am.)
Menon, T. B., 603 (G. V.)
——, with Mahadevan, 680 (Hel.)
Menzi, E., with Doerr, 696 (Hel.)
Mer, G., 304 (Ent.)
——, with Kligler, 834 (Mal.)
——, with —— & Olitzki, 468 (Mal.)
Mercier, (870) (Mal.)
Merklen, P. & Waitz, R., 370 (Lept.)
——, ——, Albot, G. & Kabaker, J., (389) (Am.)
Mertens, W. K., with Hoffmann & Snijders, 407 (Fev.)
Mesnard, Robin & Treillard, (95) (Mal.)
Meyer, E., 599 (C.Bu.)
Mezger, J. G., 142 (Rab.)
——, with Levaditi, 575 (Rab.)
——, with —— & Schoen, 134 *ter*, 575 (Rab.)
Mezincescu, D., Peter, F. M. & Cornelson, D. A., 822 (Mal.)
Micheletti, E., 321 (K.A.), 532 (Pl.), 537 (Chl.)
Mihailescu, G., with Magheru, A. & Magheru, G., (540) (Chl.)
Miller, D., (184) (Z.)
Miller, H. M., Jr. & Gardiner, M. L., 682 (Hel.)
Miller, J. J., Jr., with McCoy & Friedlander, 694 (Hel.)
Miller, S., 809 (Misc.)
Milligan, E. T. C. (764) (Am.)
Millischer, P., with Jude, 175, 535 (Chl.)
——, with —— & Martin, 170 (Chl.)
——, with Lauzeral, (169) (Pl.)
Milne, J. C., 607 (Ent.), 673 (Hel.)
Misaka, O., with Iguchi, Ohotsubo, Sugina, Kanno, Nagatsuka, Okuaki, Kashiwagi, Oshima, Ehuchi, Hachiya & Ohsuka, 27 (Dys.)
Missiroli, A., Hackett, L. W. & Martini, E., 833 (Mal.)
Mitra, J., with Cropper, 24 (Am.)
Mitsuhori, S., 316 (Ent.)
Miyahara, H. & Ishioka, H., 82 (Mal.)
——, with Morishita & Ishioka, 81 (Mal.)
Miyamoto, M., 218 (Hel.)
Mochtar, A., (367) (R.F.)
——, with Aulia, Cohen & Sardjito, 17 (Lept.)
Modaldi, T. de S., with Troisier, 858 (Mal.)
Modena, Regia Università di : 657 (B.R.)
Moise, R., 51 (Misc.)
Moldavskaya-Kritchevskaya, V., with Karout, 892 (Fev.)
——, with Tzechnowitzer, Gorchowa & Fridman, 892 (Fev.)
Moldawskaja-Kritschewskaja, W. D., Gritzay, P. K. & Uman, G. M., 855 (Mal.)
——, with Tzechnowitzer & Gorchowa, 483 (Mal.)
Mollaret, P., 853 (Mal.)
Mollow, W., (870) (Mal.)
Molloy, D. M., 692 (Hel.)
Monacelli, M., 756 (K.A.)
Mondolfi, E. & Moretti, A., (501) (Mal.)
Monier, H. & Dang-Teh-Trinh, 737 (Pro.)
Monnerot-Dumaine, M., 385 (Am.)
Monserrat, C., 588 (Der.)
Montañes, P., 561 (Lep.)
de Monte, A. J., with Pasricha & Gupta, 174 (Chl.)
Monteiro, J. L., 9 (Y.F.), 574 (B.R.)
—— & da Fonseca, F., 892, 893 *bis*, (913) (Fev.)
—— & Travassos, J., 4, 7 (Y.F.)
Montel, J., 49 (Misc.)
Montel, R., 186, 597 (Y. & S.), (764) (Am.)
—— & Couput, A., 596 (Y. & S.)
Montestruc, E., 106 (S.S.)
Montfort, R., 756 (K.A.)
Montgomery, W. M., 500 (Mal.)
Montoya, D. J. & Ortiz, L. J., 761 (Dys.)
de Moor, C. E., with Walch, 814 (Misc.)
Moorthy, V. N., 230 *bis* (Hel.)
Mooser, H., 390 (Fev.)
Morard, 710 (Hel.)
Moreira, D., 654 (Misc.)
Moretti, A., (29) (Am.)
——, with Mondolfi, (501) (Mal.)

Moretti, E., 756 (K.A.)
Morgan, M. T., 535 (Chl.)
Morgenstern, M., with Paulson, 388 (Am.)
Morin, H., 610 (Ent.)
Morin, H. G. S. & Toumanoff, C., 462 (Mal.)
Morishita, K., (95), 489 (Mal.)
——, Miyahara, H. & Ishioka, H., 81 (Mal.)
—— & Omori, N., 622 (Ent.)
Morison, J., 131 (B.R.), 253 (Misc.)
Morrell, C. A., with Wakeman, 8, 356 (Y.F.)
——, with ——, Eisenman, Sprunt & Peters, 520 (Bl.)
Morris, K. R. S., 117 (S.S.)
——, with Pomeroy, 311 (Ent.)
Moschini, S., (29) (Am.)
Moshkovsky, S., (501) (Mal.)
Motoura, F., with Matsumoto, (95) (Mal.)
Mouchet, R., 634 (Misc.)
Moulinier, M. R., 358 (Y.F.)
Moureau, M. & Le Chuiton, F., 725 (R. B. F.)
——, with ——, 403, 877 (Fev.)
Moustardier, G., 35 *bis* (Misc.)
Moutoussis, C., 823 (Mal.)
Mtschedlidse, J., with Kalandadse, 865 (Mal.)
Muhtar, A., with Hakki, 475 (Mal.)
Muir, E. & Chatterjee, S. N., 755 (K.A.)
—— & Lowe, J., 553 (Lep.)
—— & Santra, I., 233 (Lep.)
Mukerji, A. K., with Maplestone, 205 (Hel.)
Mukherjee, B., with Chopra, 41, 42 (Misc.)
Mulder, J., 368 (Lept.)
Müller, H., 51 (Misc.)
Mulligan, H. W. & Majid, A., 65 (Mal.)
—— & Sinton, J. A., 831 (Mal.)
——, with ——, 492 *bis* (Mal.)
Munsell, H. E., with Stiebling, 546 (Pel.)
Murat, H., 141 (Rab.)
Murgatroyd, F., 703 (Hel.)
——, with Yorke & Hawking, 794 (S.S.)
——, with —— & Hawking, 447 *bis*, 448 *bis* (S.S.)
Murphy, R. A., with Strickland, 64 (Mal.)
Murray, A., with Lawton, 879 (Fev.)
Murray, A. J., (603) (G.V.)
Myers, J. G., 308 (Ent.)

N

Nagahana, M., 737 (Pro.)
Nagatsuka, T., with Iguchi, Ohotsubo, Sugina, Kanno, Okuaki, Kashiwagi, Oshima, Ehuchi, Hacniya, Misaka & Ohsuka, 27 (Dys.)
Nagaty, H. F., 224 (Hel.)
Nájera, L., (655) (Misc.), 670 (Hel.)
Nandi, 544 (Bb.)
Nandi, P., (29) (Am.)
Naritomi, C., (231) (Hel.)
Nash, T. A. M., 616 (Ent.)
National Medical Journal of China, 92 (Mal.)
Nattan-Larrier, L. & Noyer, B., 119, 452 (S.S.), 731 *sex* (Pro.)
Nauck, E. G., 546 (Pel.)
Nayar, K. K. & Nayudu, N. G. J., 376 (Oph.)
Nay-Huoth, with Grenierboley, (869) (Mal.)
Nayudu, N. G. J., with Nayar, 376 (Oph.)
Negroni, P., 814 (Misc.)
Neitz, W. O. & Marais, I. P., 576 (Rab.)
Nelis, P., with Van den Branden, 859 (Mal.)
Neogi, S. K., with Sur, 753 (K.A.)
Neshoukati, H., with Azmy & Effat, 814 (Misc.)
Netto, S., (244) (Lep.)
Neumann, H., 708 (Hel.), 859 (Mal.)
Neumann, M. W., with Serebrennaja & Grünfeld, (914) (Fev.)
Newman, B., with Bloom, (594) (Der.)
Newman, C. D., with White, 65 (Mal.)
Newton, M. V. B., with Bedford & Williams, 616 (Ent.)
Nguyen-ba-Tung, M., with Berret, (763) (Am.)
Nicholas, M. J., 141 (Rab.)
Nickum, O. C., 868 (Mal.)
Nicol, W. D., 76 (Mal.)
——, with James & Shute, 74 (Mal.), 733 (Pro.)
Nicolau, S., Cruveilhier, L. & Kopciowska, L., 143 (Rab.)
—— Kopciowska, L., 138, 576 (Rab.)
——, Mathis, C. & Constantinesco, V., 136 (Rab.)
Nicolle, C., 390, 398, 872, 873, 881 *bis* (Fev.), 649 (Misc.)
——, Anderson, C. & Laigret, J., 10 (R.F.)
—— & Laigret, J., 878, 880, 881, 882 *bis* (Fev.)
——, —— & Giroud, P., 880, 883 (Fev.)
——, ——, Marcandier & Pirot, R., 397 (Fev.)
——, —— & Sicard, M., 721 (R.F.)
—— & Sparrow, H., 405 (Fev.)
Nicolle, G., 541 (Bb.)
Nicolle, P., 114, 790 (S.S.)
Niel, with Gaide, 23 (Am.)
Niño, F. L. & Defazio, F. (712), *bis* (Hel.)
Nishi, M., 686 (Hel.)
Nishihori, S., (95) (Mal.)
van Nitsen, R., (95) (Mal.), 658 (B.R.)
Nobéchi, K., (540) (Chl.)
Nono, A. M., with Russell, 491 (Mal.)
Norbury, L. E. C., (764) (Am.)
Normet, L. & Haslé, G., 644 (Misc.)
Noronha, A. J., 807 (Misc.)
Nortier, A., 23 (Am.)
Nouchy, A., with Benhamou, (500) (Mal.)
Noury, M., with Blanc, Baltazard, & Fischer, 890 (Fev.)
——, with —— & Fischer, 722 (R.F.), 906 (Fev.)
Novikova, E. & Lalazarov, G., 163 (Pl.)
Noyer, B., with Nattan-Laurier, 119, 452, (S.S.), 731 *sex* (Pro.)
Nyasaland Protectorate, 177 (Z.)

O

O'Connor, F. W., with Waters, 215 (Hel.)
Odry, with Benhamou, (500) (Mal.)
d'Oelsnitz, 752 (K.A.)
—— & Faure-Brac, 754 (K.A.)
—— & Gautschi, 756 (K.A.)
d'Oelsnitz, M., 573 (B.R.)
Ohotsubo, I., with Iguchi, Sugina, Kanno, Nagatsuka, Okuaki, Kashiwagi, Oshima, Ehuchi, Hachiya, Misaka & Ohsuka, 27 (Dys.)

Ohsuka, T., with Iguchi, Ohotsubo, Sugina, Kanno, Nagatsuka, Okuaki, Kashiwagi, Oshima, Ehuchi, Hachiya & Misaka, 27 (Dys.)
Okamoto, K., with Shoda, Koreyeda, Kodama & Otomo, 534 (Chl.)
Okuaki, G., with Iguchi, Ohotsubo, Sugina, Kanno, Nagatsuka, Kashiwagi, Oshima, Ehuchi, Hachiya, Misaka & Ohsuka, 27 (Dys.)
Olavarria, J., with Hill, (94) (Mal.)
Oleinikow, S. W., 226 (Hel.)
Olitzki, L., with Kligler & Mer, 468 (Mal.)
de Oliveira, L., with Parreiras, Altino de Araujo, Ramos, Gonçalves, Barros & Lucena, 153 (Bb).
Olmer, D. & Olmer, J., 409 (B.R.), 752 (K.A.)
Omori, N., with Morishita, 622 (Ent.)
Orenstein, A. J., 79 (Mal.)
Oriel, G. H., 60 (B.R.)
Ortega, D., with Diaz Florez, Garcia de Cosa & Casas, (869) (Mal.)
Ortiz, L. J., with Montoya, 761 (Dys.)
Osherova, F., with Tareeff & Raskin, (713) (Hel.)
Oshima, K., with Iguchi, Ohotsubo, Sugina, Kanno, Nagatsuka, Okuaki, Kashiwagi, Ehuchi, Hachiya, Misaka & Ohsuka, 27 (Dys.)
Oshio, K., with Kuroya, 534 (Chl.)
Ota, M. & Asami, S., 239 (Lep.)
Otero, F. Q., 86 (Mal.)
Otomo, T., with Shoda, Koreyeda, Kodama & Okamoto, 534 (Chl.)
Otsubo, G., with Iguchi, 27 (Dys.)
Otsuka, H., 559 (Lep.)
Ott, 98, 101 (Bl.)
Otto, G. F., with Cort, 683 (Hel.)
Ottolenghi, D., 82 (Mal.)
Ouchakov, V., 141 (Rab.)
Ozeki, Y., 725 (R.B.F.)

P

Padget, P., with Boggs, 146 (Pel.)
Paine, R. W., 179 (Z.)
Palawandow, H. & Serebrennaja, A. I., 576, 582 (Rab.)
Paldrock, A., 558 (Lep.)
Palmer, J. H. & Crawford, D. J. M., 721 (R.F.)
Palthe, P. M. van W., (655) (Misc.)
Pampana, E. J., with Puntoni, 590 (Der.)
Panagia, A., 684 (Hel.), 857 (Mal.)
Panayotatou, A., (29) (Am.), 168 (Pl.), 403 *bis* (Fev.)
Papayoannou, A., with Lépine & Markianos, 559 (Lep.)
Parada, A., with Varela & Ramos, 887 (Fev.)
Paris Eguilaz, H., 110 (S.S.), 717 *bis* (Y.F.)
Parker, R. R., 897 (Fev.)
—— & Davis, G. E., 893, 894 (Fev.)
——, with Philip, 898 (Fev.)
——, Philip, C. B. & Jellison, W. L., 899 (Fev.)
Parreiras, D., Altino de Araujo, E., Ramos, M., Gonçalves, B., Barros, R. R., Lucena, J. & de Oliveira, L., 153 (Bb.)
Parrot, L., 308 (Ent.)
——, with Donatien & Lestoquard, 325 (K.A.)
Pascal, J. M. & Bachy, J., 326 (K.A.)
Pasricha, C. L., de Monte, A. J. & Gupta, S. K., 174 (Chl.)
Passmore, R., with Meiklejohn & Peters, (53) (Misc.)
Paterson, A. C., 846 (Mal.)
Paterson, J. C., 100 (Bl.)
Paterson, J. L. H., (367) (R.F.)
Patton, W. S., 309, 614, 615 (Ent.)
Pauli, P., (720) (Y.F.)
Paulson, M., with Morgenstern, M., 388 (Am.)
Pavlovskiĭ, E. N., 722 (R.F.)
Pawlowa, P. I., with Smorodinzew & Pawlowa, (712) (Hel.)
Pawlowsky, E. N. & Stein, A. K., 621 (Ent.)
——, —— & Perfiljew, P. P., 308 (Ent.)
Pearse, A. S., (184) (Z.)
Pechkovsky, G. & Malinine, I., 238 *bis* (Lep.)
Pecori, G. & Escalar, G., 498, (870) (Mal.)
Peel, with Schwetz, Baumann & Droeshaut, 821, 846, (870) (Mal.)
——, with ——, Droeshaut & Baumann, (96) (Mal.)
Penna, H. A., with Lloyd, 354, 714, 718 (Y.F.)
Penso, G., 24 (Am.), 217, 696 (Hel.)
Peralvo Caballero, A., 466 (Mal.)
Peratoner, U., (870) (Mal.)
——, with Marotta, (870) (Mal.)
Pereperez, Lara, G., Bote, Zozaya, Cartañá, Torrademé & Collado, G., with Pittaluga, G., 62, (95) (Mal.)
Perez, M., with Earle, 74 (Mal.)
Perfiljew, P. P., with Pawlowsky & Stein, 308 (Ent.)
Pergher, J. & van Riel, J., 388 (Dys.)
Perret-Gentil, A., 675 (Hel.)
Perrone, L., 652 (Misc.)
Perry, H. M. & Bensted, H. J., 383 (Am.)
Pervès, J., (655) (Misc.)
Pesopoulos, S., 499 (Mal.)
Peter, F. M., with Mezincescu & Cornelson, 822 (Mal.)
Peters, J. P., with Wakeman, Morrell, Eisenman & Sprunt, 520 (Bl.)
Peters, R. A., with Meiklejohn & Passmore, (53) (Misc.)
Petruschewsky, G. K. & Tarassow, W., 680 (Hel.)
Petzetakis, 15, 369 *ter* (Lept.), 648 (Misc.)
——, Melanidis, C. & Tzortzakis, 18 (Lept.)
Peycelon, A., with Tanon & Lassablière, 788 *bis* (S.S.)
Peyre, (169) (Pl.)
Pezzi, G., (562) (Lep.)
Pheloukis, T., with Caminopetros & Contos, 907 (Fev.)
Phelps, B. M. & Jantzen, W., (95) (Mal.)
Philip, C. B., 353 (Y.F.)
—— & Parker, R. R., 898 (Fev.)
——, with —— & Jellison, 899 (Fev.)
Philippine Health Service, 235 (Lep.)
Philiptschenko, A. A., 572 (B.R.)
Phinos, V., 319, 320 (K.A.)
Piccoli, G., (913) (Fev.)
Pieraerts, G., 115 (S.S.)

Pieraerts, G. & Konné, M., 115 (S.S.)
Piéri, J., with Joyeux, 907 (Fev.)
Pijper, A. & Dau, H., 909 (Fev.)
Pillai, M. D., (913) (Fev.)
Pilot, I., with Amtman, 126 (C.Bu.)
Pinelli, A., 474 (Mal.)
Pines, A. I., with Sternberg, 723 (R.F.)
Pinto, C., (622) (Ent.)
Pinto, G. de S., (870) (Mal.)
Pirot, R., with Le Moult, 215 (Hel.)
——, with Marcandier, 639 (Misc.), 877 *bis*, 889 (Fev.)
——, with Nicolle, Laigret & Marcandier, 397 (Fev.)
——, with Marcandier & Plazy, 904 (Fev.)
Pisacane, C., (244) (Lep.)
Pita Gandarias, E., with Del Campo Cardona, (869) (Mal.)
Pittaluga *et al.*, 264 (B.R.)
Pittaluga, G., with Pereperez, Lara, Bote, Zozaya, Cartañá, Torrademé & Collado, 62, (95) (Mal.)
Placidi, T., 250 (Misc.)
Plantureux, E. & Hilbert, D. N., 138 (Rab.)
Plazy, L. & Germain, A., (95) (Mal.)
——, with Marcandier & Pirot, 904 (Fev.)
Pluchon, with Robert & Dareys, 474 (Mal.)
Plymouth, 436 (S.S.)
Podjapolskaja, W. P. & Gnedina, M. P., 216 (Hel.)
Poggi, I., 729 (Pro.)
Polak, H. J., 598 (C.Bu.)
Poliak, I., with Tumansky, 164 (Pl.)
Policaro, R. D., (712) (Hel.)
Politoff, A., 606 (Ent.)
Pomeroy, A. W. J. & Morris, K. R. S., 311 (Ent.)
Pons, R., 46 (Misc.), (533) (Pl.), 672 (Hel.), 725 (R.B.F.)
Ponton, G., with Boyd, 464 (Mal.)
Porter, G. S., Beck, D. & Stevens, I. M., 361 (R.F.)
Postmus, S., 357 (Y.F.), 724 (Lept.)
Pott, W. H., (870) (Mal.)
Pottier, R. & van den Branden, F., 786 (S.S.)
Prade, J. V., with Des Essarts, 880 (Fev.)
Prain, D., 76 (Mal.)
Proceedings of the Royal Society of Medicine, 254, 642 (Misc.), (764) (Am.),
Prommas, C. & Daengsvang, S., 711 (Hel.)
Public Health Reports, 901 (Fev.)
Pugatsch, E., with Serebrennaja, 579 (Rab.)
Puntoni, V. & Pampana, E. J., 590 (Der.)
Purcell, F. W., 408 (Fev.)

Q

Quarterly Bulletin Health Organisation, League of Nations, 563 (Misc.), 837 (Mal.)
Queinnec, P., with Leger, 230 (Hel.)

R

Radl, R. B. & Fallon, M., 245 (Sp.)
Radsma, W. & Streef, G. M., 34 (Misc.)
——, —— & Klerks, J. V., 35 (Misc.)
Ragazzi, G., 466 (Mal.)
Raingeard, 31 (Misc.)
Rajamoney, P. D., with Hodgkin, 834 (Mal.)
Rakotoson, J., with Hérivaux & Ranoarivony, (28) (Am.)
Ramali, A., (261), (501) (Misc.)
Ramos, A. S., 783 (S.S.)
Ramos, M., with Parreiras, Altino de Araujo, Gonçalves, Barros, Lucena & de Oliveira, 153 (Bb.)
Ramos, V., with Varela & Parada, 887 (Fev.)
Ramsay, G. C. & Carpenter, J. A. (501) (Mal.)
——, with Harrison, 459 (Mal.)
——, with Manson, 64, 820 (Mal.)
—— & Savage, J. de la M., 88 (Mal.)
Ramsdell, R. L. & Magness, W. H., 549 (Pel.)
Ranoarivony, E., with Hérivaux & Rakotoson, (28) (Am.)
Rao, B. R. R., 166 (Pl.)
Rao, M. V. R., 646 (Misc.)
Rao, R. S., 175 (Chl.)
Rao, S. S., 705 (Hel.)
——, with Acton, 699 (Hel.)
—— & Iyengar, M. O. T., 227 (Hel.)
Raskin, A., with Tareeff & Osherova, (713) (Hel.)
Rassulev, J. A., 148 (Pel.)
Ravaut, P., with Levaditi, C., Schoen & Levaditi, J., 601 (C.Bu.)
——, with ——, —— & Vaisman, 128 (C.Bu.)
——, with ——, Vaisman & Schoen, 602 (C.Bu.)
Ray, J. C., 322 (K.A.)
Raybaud, A., 243 (Lep.)
Raynal, J., with Heckenroth, 654 (Misc.)
Rebello, S., da Costa, S. F. G. & Rico, J. T., 682 (Hel.)
Records, E., 142 (Rab.)
Records of the Malaria Survey of India, 63, 472 (Mal.)
Rector, N. H., (870) (Mal.)
Reed, A. C. & Johnstone, H. G., (29) (Am.)
——, with —— & David, 757 (Am.)
——, with Koch, 25 (Am.)
Reed, J. G., 81 (Mal.)
Regendanz, P., 117, 121, 456 (S.S.)
——, with v. Brand & Weise, 120 (S.S.)
Reichenow, E., 118 (S.S.)
Reichsgesundheitsamt, Berlin, 298 (Ent.)
Reimann, H. A., Ulrich, H. L. & Fisher, L. C., 397 (Fev.)
Reiss, F., 130 (C.Bu.)
Reitano, U., (913) (Fev.)
—— & Boncinelli, U., (914) *bis* (Fev.)
——, with Spinelli, 651 (Misc.)
Remlinger, Cabanie & Bailly, (14) (R.F.)
Remlinger, P. & Bailly, J., 137 *bis*, 140 *bis*, 141, 143, 578, 586 (Rab.)
Remontet, J. E., with Vialatte, (29) (Am.)
Repetto, R., 141 (Rab.)
Resio, L. L., (764) (Am.)
Revue de Médecine et d'Hygiène Tropicales, 31 (Misc.)
Reynal, J. & Wassilieff, A., (169) (Pl.)
Rhee, Y. C., 240 (Lep.)
Rice, E. M. & Savage, J. de la M., 459 (Mal.)
Rice, J. B., 480 (Mal.)
——, with Knott, (712) (Hel.)
Richards, G. G., 902 (Fev.)
Richter, C. S., with Aalsmeer, (160) (Bb.)
Rico, J. T., with Rebello & da Costa, 682 (Hel.)

van Riel, J., with Pergher, 388 (Dys.)
Riesman, D., Fox, W. W., Alpers, B. J. & Cooper, D. A., 579 (Rab.)
Rieux, J., (95) (Mal.)
Riforma Medica, 40 (Misc.)
Riley, G. E., (870) (Mal.)
——, with Meleney & Faust, 825 (Mal.)
de Rivas, D., 206 (Hel.), (247) (Sp.)
Rivera, J., 754 (K.A.)
Robert, L., 209 (Hel.), 519 (Bl.)
——, with Cazanove, 9 (Y.F.)
——, Long, Feyte & Dareys, 541 (Bb.)
——, Pluchon & Dareys, 474 (Mal.)
Roberts, A. M. & Leach, C. W., 479 (Mal.)
Roberts, J. I. & Tonking, H. D., 910 (Fev.)
Roberts, M. A. W., with Anderson, 36 (Misc.)
Robertson, R. C., 360 (R.F.)
Robic, J., (53) (Misc.)
Robin, with Mesnard & Treillard, (95) (Mal.)
Robin, L. A., (53) (Misc.)
Robinson, J. S., 807 (Misc.)
Robinson, W., (622) *bis* (Ent.)
Rocca, G. C., 759 (Am.)
Rochaix, A., Sédallian, P. & Couture, E., 403 (Fev.)
Rockefeller Foundation, 329 (B.R.)
Rodenwalt, E., 697 *bis* (Hel.)
Rodhain, J., Dubois, A. & Hendrix, H., 788 (S.S.)
—— & Henry, E., 116 (S.S.)
Rodriguez-Molina, R., with Bachman, 222 (Hel.)
Rogers, L., 651, (816) (Misc.)
Rojas, M. D., (95) (Mal.)
Romanowa, K., with Roskin, 792 (S.S.)
Romero Calatayud, A., 683, (712) (Hel.)
Romiti, C., 705, 706 (Hel.)
Ronnefeldt, F., 645, (816) (Misc.), 844 (Mal.)
de Rook, H., with Brug, 697 (Hel.)
Rosa, A., (501) (Mal.)
Rose, E. J., with Kessel, 762 (Dys.)
Rose, F. G., 554 (Lep.)
Roseberry, S., (764) (Am.)
Rosenfeld, H., with Löhe, 127 (C.Bu.)
Roskin, G. & Romanowa, K., 792 (S.S.)
Ross, G. A. P., 45 (Misc.)
Ross, G. R., 396 (Fev.)
Rossi, (95) (Mal.)
Rothermundt, M., 13 (R.F.)
——, with Eufinger & Wiesbader, 119 (S.S.)
—— & Wichmann, F. W., 362 (R.F.)
Rotter, W. & Chavarría, P., 591 (Der.)
——, with ——, 589 (Der.)
——, with Luján, 125 (C.Bu.)
Roubaud, E., Colas-Belcour, J. & Gaschen, H., 305 (Ent.)
—— & Gaschen, H., 611 (Ent.)
—— & Stefanopoulo, G., 355 (Y.F.)
——, Toumanoff, C. & Gaschen, H., 610 (Ent.)
Rousset, J., with Garin & Gonthier, 262 (B.R.)
Row,R ., Dalal, N. P. & Gollerkeri, G. V., 492 (Mal.)
Row, Y. S., 218 (Hel.)
Roy, D. N., with Strickland, 481 (Mal.), 711 (Hel.)
——, with —— & Chaudhuri, 458 (Mal.)
Roy, J. N., 260 (Misc.)
Royaume de Belgique, 569 (B.R.)
Rubinstein, P. L., with Kritschewski, (94) (Mal.)
Ruge, H., (870) (Mal.)
Ruge, R., 574 (B.R.)
Ruiz, P. M., 319 (K.A.)
Rumreich, A., with Dyer & Workman, 876 (Fev.)
——, with ——, —— & Badger, 405 (Fev.)
Rumreich, A. S., 899 (Fev.)
Russell, H., 362, 363 (R.F.)
—— & Taylor, C. J. S. O., 48 (Misc.)
Russell, P. F., 462, 492, 864 (Mal.)
—— & Holt, R. L., (95) (Mal.)
——, with ——, 462 (Mal.)
—— & Nono, A. M., 491 (Mal.)
—— & Santiago, D., 305 (Ent.)
—— & West, A. P., 45 (Misc.)
——, with ——, 606 *bis* (Ent.)
Ruys, A. C., 19 (R.B.F.)

S

Sabry, I., 149, (550) (Pel.)
St. John, J. H. (29) (Am.)
Saleun, G., with Vaucel, 461 (Mal.), 576 (Rab.)
Samson, J. G., with Lara, 242 (Lep.)
Sanarelli, G., 640 (Misc.)
Sandels, M. R. & Grady, E., 151 (Pel.)
Sanders, J. P. & Dawson, W. T., (501) (Mal.)
——, with —— & Tomlinson, (500) (Mal.)
——, with Stone, Gaskill, Barton, Schulze & Dawson, 849 (Mal.)
Sangiorgi, G., (764) (Am.)
Santiago, D., with Russell, 305 (Ent.)
Santra, I., with Muir, 233 (Lep.)
Sardjito, M., 16, 371 (Lept.)
——, with Aulia, Cohen & Mochtar, 17 (Lept.)
—— & Sitanala, J. B., 242 (Lep.)
Sarkar, H. P., with Sur & Banerji, 85 (Mal.)
Sarkar, S. L., (501) (Mal.)
Sarnelli, T., 755 (K.A.)
Saunders, G., 379 (Oph.)
Sautet, J., 479, (501), 853 (Mal.)
Savage, J. de la M., with Ramsay, 88 (Mal.)
——, with Rice, 459 (Mal.)
Savino, E., with Sordelli, 761 (Dys.)
Sawyer, W. A., (9) (Y.F.)
——, with Hughes, 2 (Y.F.)
——, Kitchen, S. F. & Lloyd, W., 6 (Y.F.)
Sayers, E. G., 36 (Misc.)
Scaffidi, V., (764) (Am.)
Scander, D., with Corkill, 593 (Der.)
Schaffer, J. M., with Wright, 205 (Hel.)
——, with ——, Bozicevich & Underwood, 674 (Hel.)
Schewebel, A., & Fourrier, J., (326) (K.A.)
Schneider, J. E. & McGroarty, B. J., 581 (Rab.)
Schnitzer, R., 328 (B.R.)
Schoen, R., with Levaditi & Mezger, 134 *ter*, 575 (Rab.)
——, with ——, C., Ravaut & Levaditi, J., 601 (C.Bu.)
——, with ——, —— & Vaisman, 128, 602 (C.Bu.)
Schoute, E., with de Buck & Swellengrebel, 70 (Mal.)

Schulemann, W., 76 (Mal.)
Schulze, V. E., with Stone, Gaskill, Sanders, Barton & Dawson, 849 (Mal.)
Schuurman, C. J., 165 (Pl.)
Schwartz, M., (870) (Mal.)
Schweinburg, F., 137 (Rab.)
——, with Löffler, 138, 140 (Rab.)
Schwetz, J., (96), 469 *bis*, (870) (Mal.), 292 (Ent.), 556 (Lep.), 732 *bis* (Pro.), 777 (S.S.)
——, Baumann, H., Peel & Droeshaut, 821, 846, (870) (Mal.)
——, Peel, Droeshaut & Baumann, H., (96) (Mal.)
Scott, C. J., 595 (Y. & S.)
Scott, R. R., 358 (Y.F.)
Sebrell, W. H., with Wheeler, 150 (Pel.)
Sédallian, P., with Rochaix & Couture, 403 (Fev.)
Seegert, J., with Collier, 790 (S.S.)
Segal, B. E., 178 (Z.)
Ségal, J., (29) (Am.)
Sellards, A. W. & Laigret, J., 6, 359 (Y.F.)
Sen, B., with Chopra & Gupta, 474, 844 (Mal.)
Senevet, G., 611 (Ent.)
——, with Sergent, Et. & Catanei, (96) (Mal.)
Seraglia, P., (54) (Misc.)
Serebrennaja, A. I., Grünfeld, A. A. & Neumann, M. W., (914) (Fev.)
——, with Palawandow, 576, 582 (Rab.)
—— & Pugatsch, E., 579 (Rab.)
Sergent, A., with Sergent, Et., Catanei & Trensz, 299 (Ent.)
——, with ——, Trensz & Vogt, 84 (Mal.)
Sergent, Ed., (261), 806 (Misc.), 827 (Mal.)
——, et al, 472 (Mal.)
——, with Lasnet, (94) (Mal.)
—— & Sergent, Et., 90 (Mal.)
Sergent, Et., 68 (Mal.), 299, 300 (Ent.), (870) (Mal.)
—— & Catanei, A., 85, 491 (Mal.)
——, —— & Senevet, G., (96) (Mal.)
——, ——, Trensz, F. & Sergent, A., 299 (Ent.)
——, Sergent, A., Trensz, F. & Vogt, D., 84 (Mal.)
—— & Trensz, F., 611 (Ent.)
Shahin Pacha, M., 535 (Chl.)
Sherif, M. A. F., 50 (Misc.)
Sherman, H. C. & Derbigny, I. A., 549 (Pel.)
Sherwood, N. P. & Heathman, L., 25 (Am.)
Shillong, 253 (Misc.)
Shimidzu, S., 610 (Ent.)
Shipley, P. G., 908 (Fev.)
Shoda, T., Koreyeda, T., Kodama, T., Okamoto, K. & Otomo, T., 534 (Chl.)
Shope, R. E., 577, 578 (Rab.)
Shortt, H. E., 583 (Rab.)
Shrivastava, D. L., with Linton, 539 (Chl.)
Shute, P. G., 605 (Ent.)
——, with James & Nicol, 74 (Mal.), 733 (Pro.)
Sicart, M., (871) (Mal.)
—— with Nicolle & Laigret, 721 (R.F.)
—— & Villain, G., 461 (Mal.)
Silva, F., 325 (K.A.)
Simić, T., 729 (Pro.), 759 (Am.)
Singh, B. H., (96) (Mal.)
Singh, J., with Lall, 474 (Mal.)
Singh, S. A. S. J., (871) (Mal.)
Sinton, J. A., 669 (Hel.), (871) (Mal.)
—— & Mulligan, H. W., 492 *bis* (Mal.)
——, with ——, 831 (Mal.)
Sitanala, J. B., with Sardjito, 242 (Lep.)
Skinner, A. H. & Gillison, K., (29) (Am.)
Slatineanu, A., Balteanu, I. & Alexa, I., 62 (Mal.)
Sliwensky, M., (871) (Mal.)
Slot, G. A. & van der Walle, N., 369 (Lept.)
van Slype, W., 311 (Ent.), (521) (Bl.), 670, 671, 707 (Hel.), (816) (Misc.)
de Smidt, F. P. G., 166 (Pl.)
Smidt, H. N., (562) (Lep.)
Smith, A. W. H., 489 (Mal.)
Smith, C. R., 500 (Mal.)
Smith, E. C., 188 (B.R.), 642, 643 (Misc.)
Smith, H. M., 141 (Rab.)
Smorodinzew, I. A., Bebeschin, K. W. & Pawlowa, P., (712) (Hel.)
Snell, J. A., 210 (Hel.)
Snijders, E. P., (29) (Am.)
——, with Hoffmann & Mertens, 407 (Fev.)
——, with Kouwenaar & Wolff, 393 (Fev.)
——, ——, Maasland, J. H. & Wolff, J. W., 49 (Misc.)
Snyder, H. M., with Ashford, 702 (Hel.)
Sociedad Argentina Patologia Regional del Norte, 253 (Misc.)
Société des Nations. Organisation d'Hygiène 264, 410 (B.R.)
Soerono, M., Lallemant, G. F. M. A. & Soesilo, R., 70 (Mal.)
Soesilo, R., 463 (Mal.), (816) (Misc.)
——, Gilbert, A. P. W. & Bagindo, Z. G. S., 481 (Mal.)
——, with Soerono & Lallemant, 70 (Mal.)
Sohier, H., with de Marqueissac, 554 (Lep.)
Soper, F. L., Frobisher, M., Jr., Kerr, J. A. & Davis, N. C., 3 (Y.F.)
Sordelli, A. & Savino, E., 761 (Dys.)
Soriano, F., (14) (R.F.)
Souchard, 524 (Pl.), 724 (Lept.)
——, Marneffe, Lieou & Vielle, E., 400 (Fev.)
Soule, M. H. & McKinley, E. B., 238 (Lep.)
Southern Medical Journal, 825 (Mal.)
Southern Rhodesia, 799 (Misc.)
d'Souza, A. J., 595 (Y. & S.)
de Souza-Araujo, H. C., 238 (Lep.)
Spaar, E. C., 868 (Mal.)
Spangenberg, J. J., (29) (Am.)
Sparrow, H., with Nicolle, 405 (Fev.)
Spencer, P. H. A., (96) (Mal.)
Spies, T. D., 549, 550 (Pel.)
Spinelli, A. & Reitano, U., 651 (Misc.)
Sprunt, D. L., with Wakeman, Morrell, Eisenman & Peters, 520 (Bl.)
Stabler, R. M., 178 (Z.)
——, with Arnett & Wenrich, 758 (Am.)
Staley, J., with Marshall, 297 (Ent.)
Stamatesco, S., with Combiesco, D., Bonciu & Combiesco, N., 891 (Fev.)
Stanley, H. W., (96) (Mal.)
Stanley, L. L., with David & Johnstone, 386 (Am.)
Stannus, H. S., 597, 598 (C.Bu.), 817 (B.R.)
Stanton, A. T. & Fletcher, W., 327 (B.R.)
Statistical Bulletin, Metropolitan Life Insurance Co., 144 (Pel.)
Staudt, H., 482 (Mal.)

Steel, C. R., (187) (Y. & S.)
Stefanopoulo, G. J., 350, 354, 716, 719 (Y.F.)
—— & Callinicos, G., 8, 353 (Y.F.)
——, with Roubaud, 355 (Y.F.)
—— & Wassermann, R., 718 (Y.F.)
Stein, A. K., with Pawlowsky, 621 (Ent.)
——, with —— & Perfiljew, 308 (Ent.)
Stein, H. B., (502) (Mal.)
Stein, L., 789 (S.S.)
Stein, R. O., (594) (Der.)
Sternberg, E. J. & Pines, A. I., 723 (R.F.)
Sterne, J., with Laignel-Lavastine & Boquien, (18) (Lept.)
Steven, G. H., 542 (Bb.)
Stevens, I. M., with Porter & Beck, 361 (R.F.)
Stewart, M. J., 254 (Misc.)
Stewart, R. C., 724 (R.B.F.)
Stiebeling, H. K. & Munsell, H. E., 546 (Pel.)
Stock, P. G., 167 (Pl.)
Stone, C. T., Gaskill, R. C., Sanders, J. P., Barton, J. C., Schulze, V. E. & Dawson, W. T., 849 (Mal.)
Stoute, D. G., 84 (Mal.)
Strachan, P. D., 556 (Lep.), 807 (Misc.)
Stratman-Thomas, W. K., with Boyd, 471 *ter*, 489, 852, 853 (Mal.)
——, with Matheson & Boyd, 488 (Mal.)
Strauss, H., 600 (C.Bu.)
Streef, G. M., with Radsma, 34 (Misc.)
——, with —— & Klerks, 35 (Misc.)
Streignart, 214 (Hel.)
Strickland, C. & Chowdhury, K. L., 835 (Mal.)
—— & Murphy, R. A., 64 (Mal.)
—— & Roy, D. N., 481 (Mal.), 711 (Hel.)
——, —— & Chaudhuri, H. P., 458 (Mal.)
Stroesco, G., with Marinseco, 135 (Rab.)
Strong, W. M., 252 (Misc.)
Stuart, G. & Krikorian, K. S., 139, 586 (Rab.)
Stuppel, R., 374 (Oph.)
Sturton, S. D., with Garnett, (389) (Am.)
Stylianopoulos, M., 366 (R.F.)
Suárez, J., (713) (Hel.)
Suárez, R. M., 685 (Hel.)
Suarez Peregrin, E., 727 (Pro.)
——, with Fernendez Martinez, (816) (Misc.)
Sugina, T., with Iguchi, Ohotsubo, Kanno, Nagatsuka, Okuaki, Kashiwagi, Oshima, Ehuchi, Hachiya, Misaka & Ohsuka, 27 (Dys.)
Sulzberger, M. B. & Wise, F., 126 (C.Bu.)
Sumi, I. & Kawasaki, S., 217 (Hel.)
Sur, S. N., Bhattacharji, K. P. & Khan, B. M., (871) (Mal.)
—— & Neogi, S. K., 753 (K.A.)
——, Sarkar, H. P. & Banerji, K. M., 85 (Mal.)
Surbek, K. E., 75 (96) (Mal.), (816) (Misc.)
Suzuki, M., with Hiyeda, 20 (Am.), 669 (Hel.)
Sweeny, M. A., with Walker, 404 (Fev.)
Swellengrebel, N. H., 76, 824 (Mal.)
—— & de Buck, A., 89 (Mal.), 613 (Ent.)
——, with ——, 612 (Ent.)
——, with —— & Schoute, 70 (Mal.)
——, with —— & Torren, 612 (Ent.)
Swynnerton, C. F. M., 618 (Ent.)
v. Szentkirályi, S. & v. Lörincz, F., 615 (Ent.)

T

Taddia, L., (871) (Mal.)
——, with Franchini, 736 (Pro.)
Takada, I., with Kitamura, (231) (Hel.)
Takahashi, K., with Kodama, 889 (Fev.)
Takasaki, J., 670 (Hel.)
Takata, S., with Hosoya & Terao, 762 (Dys.)
Taliaferro, W. H., 86 (Mal.) 122 (S.S.), 726 (Pro.)
Tallo, F., 382 (Am.)
Talysin, T., 215 (Hel.)
Tanabe, M. & Komada, K., 736 (Pro.)
Tanon, Lassablière, P. & Peycelon, A., 788 *bis* (S.S.)
Tarassoff, W., 678 (Hel.)
Tarassow, W., with Petruschewsky, 680 (Hel.)
Tareeff, E., Osherova, F. & Raskin, A., (713) (Hel.)
Tareev, E. M. & Gontaewa, A. A., 487 (Mal.)
Tartakoff, J. & Vibber, F. L., 143 (Rab.)
Tassoni, 376 (Oph.)
Tate, P. & Vincent, M., 179 (Z.), 492 (Mal.)
Taylor, 167 (Pl.)
Taylor, A. L., with White, (550) (Pel.)
Taylor, A. W., 105 (S.S.), 313 (Ent.)
——, with Beeuwkes, Kerr & Weathersbee, 350 (Y.F.)
Taylor, C. J. S. O., with Russell, 48 (Misc.)
Taylor, J., 527 (Pl.), 636 (Misc.)
Taylor, K. P. A., 76 (Mal.)
Tchang, J., with Gajdos, 876 (Fev.)
Teboulle, 142 (Rab.)
Tegoni, G., (871) (Mal.)
——, with Aureli, B. W., (96) (Mal.)
Terai, T., 681 (Hel.)
Terao, S., with Hosoya & Takata, 762 (Dys.)
Terasako, S., 672 (Hel.)
Tessitore, C., (54) (Misc.), 186 (Y. & S.)
Teubner, E., with Martini, 609, (622) (Ent.)
Thannhauser, S. J., 547 (Pel.)
Thaysen, T. E. H., 57 (B.R.), 148 (Pel.)
Theiler, M., 714 (Y.F.)
——, with Haagen, 8 (Y.F.)
Themelin, R., (655) (Misc.)
Théobalt, E., 855 (Mal.)
Theodor, O., with Adler, 318 (K.A.)
van Thiel, P. H., 372 (Lept.), 831 (Mal.)
——, with Beunders, 364 (R.F.)
Thiodet, with Lemaire, Laget & Flandrin, (501) (Mal.)
Thiry, U. & van Meirhaeghe, A., 16 (Lept.)
—— & Tielliu, G., 371 (Lept.)
Thomas, 556 (Lep.)
Thompson, C. J. S., 263 (B.R.)
Thomson, J. G., 642 (Misc.), 827 (Mal.)
Thonnard-Neumann, E., (96) (Mal.), 259 (Misc.)
—— & LeDoux, H. A., (96) (Mal.)
Thygeson, P., 374 (Oph.)
Tielliu, G., with Thiry, 371 (Lept.)
Tillema, S., (816) (Misc.)
Timpano, P., (713) (Hel.)
Tiong, J. O., 374 (Oph.)
Tisseuil, J., 242, 555, 561 *bis* (Lep.)
Titvinidze, I. G., 759 (Am.)
Tomlinson, L. M., with Dawson & Sanders, (500) (Mal.)
Tonking, H D., 395 (Fev.)

Tonking, H. D., with Roberts, 910 (Fev.)
Toomey, N., 874, 875 (Fev.)
Tootell, G. T., (540) (Chl.)
Torrademé, with Pereperez, Lara, Bote, Zozaya, Cartañá, Collado & Pittaluga, 62, (95) (Mal.)
Torren, G. V. D., with de Buck & Swellengrebel, 612 (Ent.)
Torrioli, M., (96) (Mal.)
Toscano, J. M., with Gonzalez, 756 (K.A.)
Toumanoff, C., (502) (Mal.), 804 (Misc.)
——, with Morin, 462 (Mal.)
——, with Roubaud & Gaschen, 610 (Ent.)
Transactions of the Royal Society of Tropical Medicine and Hygiene, 76 (Mal.)
Trausmiller, O., 865 (Mal.)
Traut, H., 588 (Der.)
Travassos, J., with Monteiro, 4, 7 (Y.F.)
Trawiński, A. & Maternowska, I., 695 (Hel.)
Tréfouel, J., M. et Mme., Bovet, Benoit & Fourneau, 849 (Mal.)
——, with Fourneau, Bovet & Koetschet, 789 (S.S.)
Treillard, with Mesnard & Robin, (95) (Mal.)
Treillard, J., (502) (Mal.)
Trensz, F., 483 (Mal.)
—— & Jardon, M., 452 (S.S.)
——, with Sergent, Et., 611 (Ent.)
——, with ——, Catanei & Sergent, A., 299 (Ent.)
——, with ——, Sergent, A. & Vogt, 84 (Mal.)
Troisier, J., 18 (Lept.)
—— & Cattan, R., 907 (Fev.)
—— & Modaldi, T. de S., 858 (Mal.)
Trolli, G., (816) (Misc.)
Trowell, H. C., 645 (Misc.)
True, G. H., Jr., (317) (Ent.)
Tscheschkow, A. M., 137 (Rab.)
Tsuchiya, H., (54) (Misc.)
Tsurumi, M., (540) (Chl.)
Tubangui, M. A., 210 (Hel.)
Tumansky, V. & Poliak, I., 164 (Pl.)
Tupa, A., with Jonesco-Mihaiesti, Wismer & Badenski, 128 (C.Bu.)
Turégano, J. F. M., with Liria Borderas, (501) (Mal.)
Turner, E. L., Berberian, D. A. & Dennis, E. W., 681 (Hel.)
Turner, R. H., 548 (Pel.)
Tzechnowitzer, M. M., Gorchowa, E. L. & Moldavskaja-Kritschewskaja, W. D., 483 (Mal.)
——, Moldavskaya-Kritschevskaya, V., Gorchowa, E. & Fridman, G., 892 (Fev.)
Tzortzakis, with Petzetakis & Melanidis, 18 (Lept.)

U

Uganda Protectorate, 433 (S.S.)
Ugo, R. & Boncinelli, U., 908 (Fev.)
Ujlaki, P., (521) (Bl.), (713) (Hel.)
Ulrich, H. L., with Reimann & Fisher, 397 (Fev.)
Uman, G. M., with Moldawskaja-Kritschewskaja & Gritzay, 855 (Mal.)
Underhill, F. P., 151 (Pel.)
Underwood, P. C., with Wright, Bozicevich & Schaffer, 674 (Hel.)
United Fruit Company, Boston, Mass., 30 (Misc.). 61 (Mal.)
Urbino, C. M. & Laurel, A. G., 303 (Ent.)
Ury, J., with Dubois, 556 (Lep.)

V

Vaccarezza, R. F. & Vaccarezza, A. J., (96) (Mal.)
Vagliano, M., with Liviérato & Constantacato, 857 (Mal.)
Vaisman, A., with Levaditi, Ravaut & Schoen, 128, 602 (C.Bu.)
Valcke & Bourguignon, 519 (Bl.)
Van den Branden, F., 107 (S.S.)
—— & Appelmans, M., 48 (Misc.)
—— & Dubois, A., 444 (S.S.)
—— & Dumont, P., 116 (S.S.)
—— & Nelis, P., 859 (Mal.)
——, with Pottier, 786 (S.S.)
Van der Horst, G. A. & Verhaart, W. J. C., 837 (Mal.)
Van der Scheer, A., 246 (Sp.)
Van der Walle, N., 28 (Dys.). 523 (Pl.)
——, with Slot, 369 (Lept.)
Vareed, C., with David, 815 (Misc.)
Varela, G., Parada, A. & Ramos, V., 887 (Fev.)
Vasudevan, A., 592 (Der.)
Vattuone, A. B., (713) (Hel.)
Vaucel, 797 (S.S.)
Vaucel, M., with Bouffard, 763 (Dys.)
—— & Saleun, G., 461 (Mal.), 576 (Rab.)
Vaughan, J., 254 (Misc.)
Vedder, A. & van Dam, W., 173 *ter* (Chl.)
van Veen, A. G., 155 (Bb.)
Veneroni, C., 806 (Misc.)
Venezuela, 132 (B.R.)
Verbunt, J. A., (187) (Y. & S.)
Verder, E., with McKinley. 559 (Lep.)
v. Veress, F., 598 (C.Bu.)
Verhaart, W. J. C., with Van der Horst, 837 (Mal.)
Verliac, with Vialard & Berge, 562 (Lep.)
Viala, J., 584 (Rab.)
Vialard, Verliac & Berge, 562 (Lep.)
Vialatte, C., 209 (Hel.)
Vialatte, E. F. C. & Remontet, J. E., (29) (Am.)
Vianna, A., with Cruz, 542 (Bb.)
Vibber, F. L., with Tartakoff, 143 (Rab.)
Vielle, with Souchard, Marneffe & Lieou, 400 (Fev.)
Vieru, M. C., with Ciuca & Ballif, 490 (Mal.)
——, with ——, Balteanu, Baillif, Irimesco, Alexa, Constantinesco, Jancou & Agapi, 62 (Mal.)
Villain, G., 295 (Ent.)
——, with Sicart, 461 (Mal.)
Villela, G. G., with Cruz, 356 (Y.F.)
Vincent, M., with Tate, 179 (Z.), 492 (Mal.)
Vogel, H., 211, 679 (Hel.)
de Vogel, W. T., 527 (Pl.)
Vogelsang, W. A., with Hall, 179 (Z.)
Vogt, D., with Sergent, Et., Sergent, A. & Trensz, 84 (Mal.)

W

Wagner, O., 685 (Hel.).
Wagner-Jauregg, (96), 826 (Mal.)
Waitz, R., with Merklen, 370 (Lept.)
——, with ——, Albot & Kabaker, (389) (Am.)
Wakeman, A. M. & Morrell, C. A., 8, 356 (Y.F.)
——, ——, Eisenman, A. J., Sprunt, D. L. & Peters, J. P., 520 (Bl.)
Wakeshima, T., 87 (Mal.)
Wakil, A. W., 56 (B.R.)
Walch, E. W., 822 (Mal.)
—— & de Moor, C. E., 814 (Misc.)
Walker, E. L. & Sweeney, M. A., 404 (Fev.)
Walker, J. H. C. & Gibson, C. C. G., 753 (K.A.)
Walker, J. W., (655) (Misc.)
Wallace, R. B., 89, 864 (Mal.)
Walthard, B., (713) (Hel.)
Wang, S. H., with Liu & Fan, 539 (Chl.)
Warasi, W., 86 (Mal.)
Ward, C. B., with Lamson & Brown, 203 (Hel.)
War Office, 632 (Misc.)
Warren, S., with Grace, A. W. & Grace, F. B., 228 (Hel.)
Washburn, B. E., 819 (Mal.)
Wassermann, R., with Stefanopoulo, 718 (Hel.)
Wassilieff, A., 524 (Pl.)
——, with Reynal, (169) (Pl.)
Watanabe, Y. & Harazawa, J., 558 (Lep.)
Waters, H. S. & O'Connor, F. W., 215 (Hel.)
Wats, R. C. & Jafar, M., 27 (Dys.)
Watson, M., 76, (96), 493 (Mal.), (408) (Fev.)
——, with Gordon, Hicks & Davey, 301 (Ent.)
Wayl, P., (96) (Mal.)
Weathersbee, A. A., with Beeuwkes, Kerr & Taylor, 350 (Y.F.)
Webster, W. J., 531 (Pl.)
Weidman, F. D., with Wilson & Hulsey, 590 (Der.)
Weiner, E., with Bland, Goldstein & Wenrich, 729 (Pro.)
Weise, W., 727 (pro.)
——, with v. Brand & Regendanz, 120 (S.S.)
Weiss, O. L., 490 (Mal.)
Wenckebach, K. F., 157, 159 (Bb.)
Wenrich, D. H., with Arnett & Stabler, 758 (Am.)
——, with Bland, Goldstein & Weiner, 729 (Pro.)
West, A. P. & Russell, P. F., 606 *bis* (Ent.)
——, with ——, 45 (Misc.), 606 *bis* (Ent.)
Weyer, F., 613 (Ent.)
Wheeler, G. A., 547 (Pel.)
—— & Sebrell, W. H., 150 (Pel.)
Wheeler, G. C., with Gertson, Lancaster & Larson, 616 (Ent.)
White, E. B. & Taylor, A. L., (550) (Pel.)
White, R. S., 494 (Mal.)
—— & Newman, C. D., 65 (Mal.)
Whitnall, A. B. M., 457 (S.S.)
Wichels & Maass, 827 (Mal.)
Wichmann, F. W., with Rothermundt, 362 (R.F.)
Wicht, J. F., 396 (Fev.)
Wiesbader, H., with Eufinger & Rothermundt, 119 (S.S.)
Wiese, J., with Frei & Klestadt, 602 (C.Bu.)
Wigglesworth, V. B., 295, (317) (Ent.)
Wight, T. & Wight, V., 386 (Am.)
de Wildeman, E., 243 (Lep.)
Williams, D. H., with Bedford & Newton, 616 (Ent.)
Williamson, T. V., with Anderson, J. W., Kimbrough, R. & Dodson, A. I., 603 (G.V.)
Wills, L., 254 (Misc.)
Willway, F. W., (502) (Mal.)
Wilson, C. J., 68 (Mal.)
Wilson, H., 144 (Pel.)
Wilson, R. M., 243 (Lep.)
Wilson, S. J., Hulsey, S. & Weidman, F. D., 590 (Der.)
Winfield, G. A., 85 (Mal.)
Wise, F., with Sulzberger, 126 (C.Bu.)
Wismer, B., with Jonesco-Mihaiesti, Tupa & Badenski, 128 (C.Bu.)
Witenberg, G., 214 (Hel.)
Witte, J., 729 (Pro.)
Witts, L. J., 254 (Misc.)
de Wolf, H. F., & van Cleve, J. V., 125 (C.Bu.)
Wolff, J. W., 401 (Fev.), 761 (Dys.)
—— & Kouwenaar, W., 394 (Fev.)
——, with ——, 912 (Fev.)
——, with —— & Snijders, 393 (Fev.)
——, with Snijders, Kouwenaar & Maasland, 49 (Misc.)
Wolter, A., (96) (Mal.)
Wong, K. C., 191 (B.R.)
Woodcock, H. M., (29) (Am.)
Woods, T. F. M., 300 (Ent.)
Workman, W. G., 890 (Fev.)
——, with Dyer, Badger & Ceder, 875 (Fev.)
——, with —— & Rumreich, 876 (Fev.)
——, with ——, —— & Badger, 405 (Fev.)
Wormall, A., 442, 454 (S.S.)
Wright, W. H., Bozicevich, J., Underwood, P. C. & Schaffer, J. M., 674 (Hel.)
—— & Schaffer, J. M., 205 (Hel.)

Y

Yang, N. K., with Chan, 534 (Chl.)
Yato, M., (389) (Am.)
Yoffé, H., (914) (Fev.)
Yorke, W., 112 (S.S.)
—— & Hawking, F., 111 (S.S.)
——, Murgatroyd, F. & Hawking, F., 447 *bis*, 448 *bis*, 794 (S.S.)
Yoshino, K., 224 (Hel.)
Young, A. L., with Hudson, 691 (Hel.)
Yu, H. & Chen, K. F., 172 (Chl.)
Yuan-Po, L., 366 (R.F.)

Z

Zahra-Neumann, C., 320 (K.A.)
Zakon, S. J., 130 (C.Bu.)

Zaturjan, A. T., with Mathewossjan, 754 (K.A.)
Zibordi, D., 579 (Rab.)
Ziemann, H., (96) (Mal.)
Zimmermann, 172 (Chl.)
Zinsser, H. & Castaneda, M. R., 400, 887 (Fev.)
Zotta, G., 62 (Mal.), 264 (B.R.)
Zotta, G., with Combiesco, 904, 905 (Fev.)
Zottner, (54) (Misc.)
Zozaya, C. & Espinel Sabogal, S., 858 (Mal.)
Zozaya, with Pereperez, Lara, Bota, Cartaña, Torrademé, Collado & Pittaluga, 62, (95) (Mal.)
Zschucke, J., 432, 456 (S.S.)
Zuccarini, J. A. & del Ponte, E., 719 (Y.F.)

INDEX OF SUBJECTS.

Compiled by Miss M. H. JAMES.

Ainhum,
in Belgian Congo, 48 *bis*
Pathogeny of, 48

AMOEBIASIS (AMOEBIC DYSENTERY, LIVER ABSCESS, &c., *see also* **DYSENTERY**), 20–9, 382–9, 757–64
Amoebae and Entamoebae associated with
Dientamoeba fragilis: Egypt, 728
E. barreti, Immunization Experiments with 26
E. coli type Race, Variations in, 178
E. dispar, experimental Infection with, of Dogs, 759
E. histolytica
Atypical Strains, 25
in Carcinoma of Cervix Uteri, 385
Carriers of, healthy, among U.S.A. Freshmen, 758
Negative Occult Blood Tests in, 383
Pathology in, 20
Treatment of, 20
by Di-Hydranol, 259
Cultivation of, 386, 728
Cysts of, in Dog, Baltimore, 387
Viability of, 386
Diagnosis, Craig Complement-Fixation Test for, 25, 26, 387, 760
from cellular exudate, 22
House-flies as Vectors of, 382
in Kittens by Ileum Injection of Cultures, 387, 757
in Liver Abscess, 24, 384
and Other Intestinal Protozoa: Tennessee, 21, 757
Pathogenicity for Kittens, 387, 757
Post-mortem Invasion by, in experimental animals, 385
Serological Relations of, 26
in Stools of Anaemic cases, 384
in Urine, 24
Vital Staining of, 728
in vitro, Clinical application of counts, 388
E. vesicalis, in Urine, 24
Free Living and Pathogenic, Antigenic Properties of, 25 *bis*
AMOEBIC DYSENTERY
Carriers of, *see also under E. histolytica, supra*
Pathogeny of, and need of Treatment, 20 *bis*
Ulcers of, 20
Cellular Exudate in, 22
in Children, 22, 383, 385
Chlorotic syndrome in, 384
Cutaneous Abdominal Reflex in, 385
Diagnosis of, 759
Cellular Exudate in, 22–3
in Children, 22, 385
Complement Fixation Test in, 25–6, 387, 760
Immunological Tests in, 26

Amoebiasis—*cont.*
AMOEBIC DYSENTERY—*cont.*
Experimental, in Dogs, Complement Fixation in, 387, 760
in Monkeys, course of, 21
Incidence
Egypt, in Children, 383 *bis*
France: Brest, 756
India, in British Forces, 633
New Hebrides, 251
Panama, 383
Rodrigues, 629
South Melanesia, 250
U.S.A.
California, 383
San Quentin, in Prisoners, 757
Southern States, as a Public Health Problem, 758
Infection, course of, 20–1
Pathology of, in Carriers, 20
Problem of, 20 *bis*, 758
Transmission of, by House-flies, in Tennessee, 382
Raw Vegetables and Fruit, Sicily, 382
Treatment by
Anayodin (Iodoxyquinolin Sulphonic Acid), 23
Carbarsone, 383, 386
Di-Hydranol, 259
Emetine: Dosage for Children, 22
Indian, 41
Kurchi, 385 *bis*
AMOEBIC HEPATITIS, in British Forces, India, 633, 634
AMOEBIC LIVER ABSCESS
E. histolytica in, 24, 384
Incidence: Tonking; Recrudescence, 23
Treatment by Emetine, 23
Intrahepatic, 23
AMOEBIC METASTASIS, Pathogeny of, 758
AMOEBIC PERICARDITIS, 24
AMOEBIC PROSTATITIS, 759
AMOEBIC ULCERATION, Perforative, of Appendix, 384
AMOEBIC ULCERS, in Carriers, Pathology of, 20 *bis*
Origin of, 21
PULMONARY (alleged), in a Tunisian, 25
Titles of Unnoticed Papers, 28–9, 389, 763–4

BERIBERI AND EPIDEMIC DROPSY, 153–60, 541–5
BERIBERI
Adrenalin Reaction in, 158, 159
Influence on, of Lugol's Solution, 543
Cardiac Symptoms, *see* Symptoms
Cardiazol-Adrenalin Test in, 543
Diet in relation to (*see also* Rice, *infra*), 542, 543
Diseases in relation with, 156
Dry form, Chronic, 541

Beriberi and Epidemic Dropsy—*cont.*
BERIBERI—*cont.*
Etiology, 156, 541, 542, 543
Rice in relation to, 155
Heart-failure, Sudden, in, 157, 159, 543
Treatment for, 156, 158, 159, 543
Incidence
British Guiana, 542
Dutch East Indies, 157, 159
Fernando de Noronha ; Epidemic, 1931–2, 153
Japan : Deaths from, 153 *bis*
Madagascar, in Native Troops, 154–5
New Hebrides : Race Incidence, 251
Papua, 252
Philippine Islands, 155
Senegal, Dakar ; Epidemic (1932), 541 *quat.*
U.S.A., 156
Infantile
D. E. I., 159
Philippine Islands, 155
Kakke Bacillus of Matsumura, Non-Specific, 154
Rice in relation to, 154, 155, 541, 543
Silverskin and Polished, Vitamin B content of, 155
Shoshin Condition in, *see* Heart-failure, *supra*
Symptoms, Cardiac, 157, 158, 159, 543
General, 154
Nervous, 154
Polyneuritic, 542
in Slight Vitamin B Deficiency, 157
Treatment by
Counter-irritants, 542
Lugol's Iodine Solution, 543
Pitressin, 158, 159–60
Tikitiki Extract, for Children, 155
Vitamin B, 156
Vitamin B Deficiency : Results, 157
Sources, 157
Vitamin B_1
in relation to Clinical Medicine, 156–7
Content of Silverskin and Polished Rice, 156
Wet form, 541 *quint*
Cases resembling, in British Guiana, 542
Senegal : Dakar, 541
EPIDEMIC DROPSY
Etiology, 544
Incidence, India, Race and Sex, 544, 545
Oedema outbreaks in Sierra Leone resembling, 543
Pathology of, 545
Post-mortem findings, 545
Prophylaxis, Dietetic, 544
Symptoms, 544, 545
Treatment, 544
Titles of Unnoticed Papers, 160, 545

BLACKWATER FEVER, 97–103, 517–21
Biochemical Aspect, 103
Blood in, Cholesterin in, 99, 519 *bis*
Epidemiology of, 97, 517
Etiology, 97, 517
Experimental, in Dogs, 520
Familial and House, 97, 98, 499, 517
Haemoglobinuria of, 517, 519, 520

Blackwater Fever—*cont.*
Haemolysis of, Quinine and, 102–3
Immunity in, 101, 517, 828
Incidence
American Tropics (*tables*), 31
Belgian Congo : Katanga, 519
British Guiana, 97, 101, 517
D.E.I., Batavia, chiefly in Europeans, 812
England, 518
French Indo-China : Two Types, 98
Honduras, 62
India, 100, 519
Madagascar : Antananarivo, 519
New Hebrides, 251
Nigeria : Lagos, 520
Senegal : Dakar, 519
Southern Rhodesia, 799, 800, 802
Uganda, 97, 98
Malaria in relation to, 517, 828
Onset of, Diagnostic signs, 517
Pathogeny, 101
Plasmodia, Haemolytic Strains associated with, 98, 517
Pre-Blackwater State, 518
Quinine in relation to, 100, 517
Quinine Bihydrochloride and Hydrochloride, Action of, on the Haemolytic System in, 102
Titles of Unnoticed Papers, 521
Treatment, 101
Acetylarsan, 99
Alkali, 521
Atebrin, 62, 100, 520
Biocholine, 519
Blood Transfusions, 519, 520, 521
Liver Extract, 520
Plasmoquine, 100, 520
Quinine, 99, 100, 102, 519, 520

CHOLERA, 170–6 (Critical Reviews, 331–42, 411–22) ; 534–40
Acidosis in, 539
Bacteriophage in, Book on, reviewed, 131–2
Characters of, 174
Cholera-like Vibriophages, 174
Dissociation by, of *V. cholerae*, 175
Influence on, of H Ion Concentration, 175
Preparation of, for, 253
with Special Reference to, (Critical Review), 331–42, 411–22
Variations in *V. cholerae* induced by, 536
Blood in, Biochemistry of, 539
Carriers, Bactericidal Action of Di-Hydranol, 176
Danger from, 535
Examination for, 534, 535
Healthy, Significance of, 535, 536
Persistence dependent on Liver infection, 536
Sterilization of, 170, 175, 176
Diagnosis, Media for, 173 *ter*
H Ion Concentration, Influence of, on Bacteriophagy, 175
Incidence
China : Shanghai ; Epidemics 1930, 1931 and 1932, 534
India : Forecasts of, 651
Iraq : Epidemic, 1931, 170, 176, 535

Cholera—*cont.*
Incidence—*cont.*
Japan : Epidemics, 537
Kobe, 634
Syria : Damascus, 173
Infection in, Mechanism of, 640, 641
Pathogenesis of, 170, 536
Importance in, of the Liver, 171
" Pettenkoferia " Organisms in, 538
Prophylaxis
Examination of Pilgrims, 535
Immunization, Successful, Shanghai, 534
at Kobe, 534
Vaccination, Parenteral, Effect of, on Vibrios, 535
Skin Test for Susceptibility to, 172
Titles of Unnoticed Papers, 176, 540
Toxin ; Pathogenic Action, 538
Preparation of, 538
Transmission of, by Cockroaches, 651
Vibrio cholerae
Action on, of
High Temperature, 539
Lithium, 538
Bacteriological Exam. for; Kobe, 534
Dissociation of, by Bacteriophage, 175
El Tor form, Haemolysin produced by, 171, 172
Relation to, of *V. cholerae*, 171, 172, 412
Form and Growth Changes in, 538
Haemolysin and Toxin of, and Related Organisms, 171
Non-haemolytic nature of, 171, 172
and Related Organisms, Carbohydrate Fractions from, 539
Serological Study of, 171
Spontaneously Agglutinating Strains of, 172
Spread of, in Epidemics, 413
Transmissible Lysis of, 537
Two Types of, in China and Japan, 534, 537
Variations in, induced by Bacteriophage, 536
Vibrio n. sp., Isolated at Damascus from Diarrhoea Cases, 173

CLIMATIC BUBO AND LYMPHOGRANULOMA INGUINALE, 125–30 (Critical Review, 423–9), 597–602
and Allied Conditions, Recent Views upon (Critical Review), 423–29
Allied Conditions identified with, 597, 600
Articular Manifestations in, 130 *bis*
Arthritis, Episcleritis, and Skin Eruption in, 130
Book on, reviewed, 817
Cat-susceptibility to, 128, 602
Clinical Manifestations, 426
Complications, 426
Conjugal Infection, 130
Convalescent Serum in, 601
Dmelcos Test in Genito-ano-rectal Syndrome, 600
Endemic (?) : Hamburg, 599
Esthiomène, a form of, 127, 428
Frei's Reaction, 125, 129, 424, 599, 600
Urethral Secretion and, 602
Genito-ano-rectal Syndrome, (esthiomène), 127, 130, 425, 599, 600
Incidence : Argentina, 253
Austria : Vienna, 130

Climatic Bubo and Lymphogranuloma Inguinale—*cont.*
Incidence—*cont.*
Costa Rica, in Children, 125
D.E.I. : Java, 598
England : First proved Case, 598
Rumania : Increase of : Treatment, 598
U.S.A. : Chicago, 126
Literature of, a Review of, 130
in Monkeys, 601
Pathology of, 425
Phlebitis in, 127
Pseudo-Tabetic Syndrome, in Monkeys, 128
Rectal Stricture due to, 126, 130, 425, 600
Skin Eruption in, 130
Titles of Unnoticed Papers, 602
Treatment by Introcid, 127
Urethritis, Non-specific, as initial symptom, 598
Virus, Cat-Receptivity to, 128, 602
Fatal Self-Sterilizing Neuro-Infections, in Infected Monkey, 601
Inoculation of, Pseudo-Tabetic Syndrome following, 128
Neutralization of, by Convalescent Serum, 129

DENGUE, 407–8
Fevers resembling : Nigeria, 408
Two Groups of, 407
Incidence
Africa, 407, 563, 566
D.E.I. : Java, endemic, 407
Senegal : Dakar, in French Navy, 407
Syra : during Epidemic of Spirochaetal Jaundice, 408
Javanese " Endemic," Identity with Sumatran and " van der Scheer's " fever, 407
and Rift Valley Fever, relation between, 407
Titles of Unnoticed Papers, 408

DERMATOLOGY, TROPICAL, 588–94
Book on, reviewed, 188
Diseases
Blastomycosis, Dermal, Indian Archipelago, 591
Carate, *see* Pinta, *infra*
Chromoblastomycosis
Incidence
Costa Rica, 591
Dutch East Indies, 591 *bis*
Malay Archipelago, 591
U.S.A. : Texas, 590
Creeping Eruption due to Bot-Fly larva, Canada, 616
Dermatitis linearis and artificialis, from Extract of " Paederus idae Sharp," 181
Pyogenic, due to Staphylococcal Infection : Syria, 592
Dermatitis from Phlebotomus bite, 308, 615
Facial Chronic, due to *Demodex folliculorum*, 621
from Secretion of Beetle *Paederus idae*, 181
Dermatosis in Uganda Natives, 593
Favus, in Mice and Men : Australia, 589
Itch : New Hebrides, 251

Dermatology, Tropical—*cont.*
DISEASES—*cont.*
Mossy Foot, Condition resembling, in Sudanese, 593
Mycetoma pedis
Canton, China, Treatment by Iodine, 588
U.S.A. Epidemiology of, 588
Myiasis, cutaneous, due to *Wohlfahrtia vigil*, 310, 616
Piedra : Colombia, 589
Pinta : Colombia, 590
" Prickly Heat " : Treatment, 592
Pseudomycetoma : Philippines, 588
Rhinosporidium-like organism infecting Forearm : Ceylon, 592
Ringworm
Incidence
Fiji, 248–9
Florida, 589
French West Africa, 589
New Hebrides, 252
Induced, in Guineapig, 590
Trichophytosis, including Onchomycosis Universalis, simulating, 589
Staphylococcus aureus, Pyogenic Dermatitis due to, 592
Urticaria due to *Hylesia* sp. Moth, French Guiana, 317
FUNGI
Achorion quinckeanum, in Favus of Mice and Men, 589
Aspergillus cinerescens, in Pinta, 590
Monilia, Muco
Cutaneous Affections due to, Complement Deviation in, 814
Phialophora verrucosa, Chromoblastomycosis due to, 590
Trichophyton gourvili n. sp. of Human Ringworm, 589
megnini, seu *rosaceum*, in Pinta, 590
purpureum in Human Ringworm, 589
radiolatum causing Ringworm in Guineapig, 590
Trichosporon giganteum and *T. Hortai*, in Piedra, 589
Titles of Unnoticed Papers, 594

DYSENTERY, BACILLARY, CILIATE, FLAGELLATE, MIXED AND UNCLASSED (*see also* **AMOEBIASIS**), 26–9, 388–9, 761–4
BACILLARY, 26–8
in relation to Ascites in Madras, 646, 647
B. dysenteriae
Flexner Y group, condition due to, 26–7
in Normal Individuals, 27
Shiga, Epidemics chiefly due to : African Great Lake Region, 388
Carriers of, 27 *bis*
Cellular exudate in, 22
and *Ekiri*, Oral Vaccination for, 27 *bis*
Epidemiological Study of, in Sumatra, 761
Flexner Infection, Fatal, in an Ape, 763
Flexner Type, Bacteriophage Therapy in, 762
Incidence
Africa, Great Lakes Region : Prophylactic Vaccination, 388

Dysentery—*cont.*
BACILLARY—*cont.*
Incidence—*cont.*
D.E.I. : Java and Sumatra, 761
India, in British Forces, 41, 633
Bengal : Calcutta, 388
Burma, 27
Japan, 27
Spain, Las Varillas, Córdova, epidemic, 761 *ter*
U.S.A. : New Orleans, 27
Macrophages in Stools, taken for *E. histolytica*, 22
Metadysentery, Chronic, or Chronic Colitis, 762
Non-Mannite-fermenting Organism isolated from, 762
Post-Dysenteric Infections, 27
Prophylaxis
by Formolized Toxin in Tropical Africa, 763
Vaccination
Anatoxin, 388
Oral, 27 *bis*
Shiga Dysentery Toxin, Purification Method for, Antigenicity of the Anatoxin, 762
Stools of, Preservation of, 28
Transmission by Cockroaches, 651
Treatment by
Bacteriophage, 388
Emetine, 41
Polyvalent Antidysenteric " Hoechst " Serum, 633
CILIATE = BALANTIDIASIS
Balantidium coli
Cultivation of, 736, 737
Infection with, Causing Intestinal Polyp and Diarrhoea, 736
One resembling, in Wild Rats, Morphology and Culture, 737
Title of Unnoticed Paper, 738
Treatment by
Hexamethyltetramine and Quinine, 736
Yatren, 737
FLAGELLATE
GIARDIASIS = LAMBLIASIS
Incidence
Italy, Milan, in Children, 729
Prussia, in Labour Camp, 730
Rodrigues, 629
Treatment : Di-Hydranol, 259, 260
MIXED AND UNCLASSED
Bacteriophage for, Preparation of ; Shillong, 253
Incidence
India, 632
Seasonal, 633
New Hebrides, question of, 251
Titles of Unnoticed Papers, 28, 764

Enteric Fever in the Tropics
Enteric Group in British Forces : India, 633
Prophylaxis : Inoculation in, 633
PARATYPHOID C in British Guiana, 52
TYPHOID
Examination of Faeces and Urine for Bacilli, 814

Enteric Fever in the Tropics—*cont.*
TYPHOID—*cont.*
Incidence
Cuba, 260
Southern Rhodesia, 800
Infection in, Mechanism of, 640
Prophylaxis: Vaccination, 260
Transmission by Cockroaches, 651

Fevers, Unclassed, *see* **TYPHUS AND UNCLASSED FEVERS.**

Gangosa, *see under* **YAWS AND SYPHILIS**

GRANULOMA VENEREUM, 603
Incidence, India, Southern, 603
Titles of Unnoticed Papers, 603
Treatment by Fouadin, 603

Goundou
Etiology, 260
in Liberia, N.E., 636

HELMINTHIASIS, 203–31 (Critical Review, 503–16), 669–713.
American Society of Parasitologists, Report of Meeting, 207
ANKYLOSTOMIASIS
Ancylostoma associated with
Blood-sucking activities of, 686, 687, *&n.*
brasiliense (and others), Larvae of, Creeping Eruption due to, 616, 693, 694
caninum, Blood-sucking by, 686, 687 *&n.*
Clorinated Alkyl Hydrocarbons tested against, 206
Pre-natal Infection with, 221
Larvae, Infective, the Taxies of, 223, 687
Non-specific Strains of, Susceptibility, of Dogs and Cats on Deficient Diets, 221
Blood Conditions in
Anaemia of, Causation, 686, 813
Iron Metabolism and, 218
Severe, 685
in *Necator americanus* Infections, 219
Books on, reviewed, 55, 262
Complications of, 220
Cardiac, 691
in Dogs
Pre-natal Infection, 221
Variations in Intensity, 219
Experimental; Percutaneous Infection with *N. americanus*, Blood Changes in, 219
Incidence
Argentina: Buenos Aires Province, 691
Ceylon, 691
Irak, Mid-Euphrates Area, 691
Italy, Pesaro Province, 220
New Hebrides, 251
Nigeria, 220
Pacific, South, 691
Western, 248
Rhodesia, Southern, 800, 802

Helminthiasis—*cont.*
ANKYLOSTOMIASIS—*cont.*
Necator americanus Infection, Blood Changes in, 219
in New Hebrides, 251
Skin Reactions to, 222
suillus, as a Human Infection, 693
Treatment
Carbon Tetrachloride and Ethylene Tetrachloride: Mass, 248
Deaths following, 692
Ten Years of, 691
Heptylresorcinol, 220
Hexylresorcinol, 220, 692
Variations in, and Development of Host-resistance, 219
ANTHELMINTICS
Beta Naphthol, Fatal Case, 673
Carbon Tetrachloride
Effect of, on Liver, 672
Influence of Diet on Intoxication in Dogs, 672
Comparative Tests of
by Egg Counts, 203
with *T. saginata* as Test Object, 682
Di-Hydranol, 259
Hexylresorcinol, 204, 205, 692
N-Butylidene Chloride, New, 674
Ol. Chenop., Deafness due to, 673
Use of, considerations on, 203
ASCARIASIS
Ascaris associated with
Dysphagia due to, 218
Haemolytic action of, 217
Larvae of, in lungs of children, X-ray study of, 217
in sputum, 684
Ova, Development of, 684
Unfertilized, Occurrence of, 684
Psoitis due to, 218
Record number voided, 684
Immunization Experiments in Mice, 685
Incidence
Switzerland, 684
U.S.A., Southern States, 683
Infection and its Control, Summary of Knowledge on, 218
Influence of, on Growth of School-children: Manchuria, 217
Prophylaxis, U.S.A., 683
Treatment
Hexylresorcinol, 204, 205 *ter*, 692
BILHARZIAL CIRRHOSIS or Egyptian Splenomegaly, 208
see also SCHISTOSOMIASIS, *infra*
Book, on, reviewed, 572
BOTHRIOCEPHALUS, see *Diphyllobothrium infra*
Chaetopoda, Rôle of, in relation to Man, 711
Clonorchis sinensis, Japanese Weasel as Host of, 211
CYSTICERCOSIS, as Cause of Epilepsy in Man, 680
Cysticercus cellulosae
Bodies resembling shown by X-rays, 214
in Man: Japan, 681
fasciolaris
Passive Immunity to, in Rat, 682

Helminthiasis—*cont.*
Diagnosis of Helminthic Infections: A Twelve-year Survey (Critical Review), 503–16
Dicrocoeliasis, True, and Pseudo-: Differential Diagnosis of, 678
Diphyllobothrium cordiceps, a synonym of *D. latum*, 207
latum Infestation
Anaemia from, and Pernicious Anaemia, 679
Incidence
Karelia, in Men and Fish, 680
New York City, 215
strictus n. sp., New Human Parasite; Baikal Shore, 215 *ill.*, 216
tungussicum n. sp.; Siberia, 216
Dracontiasis or Guinea-worm Infestation: Dracunculosis
Incidence
French West Africa, in Natives, 710
India
Chitaldrug District, Mysore, 230
Kelgote, 230
North America: in Animals, not in Man, 710 *bis*
Prophylaxis, 230
Wells in relation to, 230
Echinococcosis = Hydatid Disease
Hydatid Cyst of Liver, Spontaneous Rupture, 212
Use of Formol in, 212
Hydatid Scolex, Development of, 212
Incidence: Normandy, in Sheep, 213
Palestine, 214
Southern India, 680
in Man and Cattle, Comparative Pathology of, 213
Transition Forms between, 682
Taenia echinococcus, Distribution of, in Palestine, 214
Thirty-two Years' Study of, 212
Treatment, Biological, 681
Egyptian Splenomegaly, *see* Bilharzial Cirrhosis, *supra*
Enterobiosis
Epidemiology of, 226 *bis*
Oxyuris vermicularis of, Appendicitis in relation to, 697
Biology of, 696
Channel of Invasion of, 226
Treatment by Hexylresorcinol, 696
Eosinophils, Origin of, 206, 671
Euparyphium ilocanum, Snails as Hosts of, 207
Fasciola Hepatica Infection in Man, 678
Infestation of Sheep: Australia, 677
Intermediate Hosts of
Argentine, 211
Cuba, 210
Fasciolopsis buski in Man: China, Morphology of, 678
Filariasis
Aëdes scutellaris, Vector of, 179
Control of, by *Megarhinus splendens*, Java, 179
Chyluria in,: British Guiana: Four Cases, 706
Complement-Fixation in, 700
Diagnosis, Antigen, Fairley's in, 700

Helminthiasis—*cont.*
Filariasis—*cont.*
Elephantiasis
Due to *F. bancrofti*, Pathology of, 699
Due to *F. malayi*, Morphology of, 697 *bis*
Filaria bancrofti
and the β-Haemolytic Streptococcus, Parallel Incidence of, 228
Biological Cycle of, in Man, 705
Embryos of, in Ascitic Effusion, 229 *bis*
Life Span in Man, 705
Resistance to Drugs and Heat, 702
Incidence: New Hebrides, 251
Infection, Complement Fixation in, 701
Experimental, with Indian Mosquitoes, 227 *table*, *ib.*
Metamorphosis of, 698, 706
Transmission of: 226, 227, 302, 698, 699
malayi, Dutch East Indies, 697 *ter*
Morphology of, 697 *bis*
Transmission of, in Celebes, 229
ozzardi: Panama, 207, 706
Periodicity of, 703 *ter*
perstans Embryos in Cerebrospinal Fluid in Trypanosomiasis, 707
Incidence
China; Amoy, Household Mosquitoes and, 698
Dutch East Indies, 697
Gabun, in Natives, Eosinophilia in, 708
Guiana, British, 706
India, British, 228
Travancore, North, 227
Trivandrum, 699
Nauru Island, 627
New Hebrides, 251
Porto Rico, 702
Infections with, Duration of, 229
Treatment
Gentian Violet, 702
Gold Therapy, 707
Gapeworm infestation in Man, Porto Rico, 711
Gnathostoma spinigerum, Life Cycle of, 711
Helminthic infections
Blood Formation in, 206, 671
Diagnosis of: A Twelve-year Survey, 503–516
Telemann technique, modified, 206
in Manchurians, 669
Ova found under Finger Nails, 670
Predisposition and Exposure, 672
in Swiss children, 669
Treatment
by Di-Hydranol, 259
by Lavage, 206
Helminthological Society of Washington, Proceedings of, 670
Himasthla mühlensi n. sp., 679
Hookworm Disease, Variations in, 219
Hymenolepis diminuta
in Man, from Ingestion of Meal Worms, 317
nana Infestation in Children, 683
Loaiasis, 707
Hip Joint Affection in, 708
Incidence: Cameroons, 708
Infection, Duration of, 229

Helminthiasis—*cont.*
LOAIASIS—*cont.*
Treatment
Quinine-iron-arsenic Preparation, 230
Sulpharsenol Injections, 708
Synthol, 230
Nematodes, Cultivation of, 683
Nippostrongylus muris, Rat Resistance to Superinfection with, 223
ONCHOCERCIASIS
Eye-changes in, 441, 709
Incidence
Belgian Congo : Ocular Manifestations, 709
U.S.A. (threatened), 709
Onchocerca caecutiens identical with *O. volvulus*, 709
Simulium in relation to, 293, 709
OPISTHORCHIASIS, in Cats : Testing, Methods for, Antimonials in, 678 *bis*
Opisthorchis felineus of, Cercariae of, 211
Molluscan Host of, 211
Treatment by
Fouadin, 211
Tartaric Acid, 211
OXYURIASIS *see* ENTEROBIOSIS *supra*
SCHISTOSOMIASIS = BILHARZIASIS
Cirrhosis of, or Egyptian Splenomegaly, 208
Incidence
Egypt : Experiments on, 669
Kenya, 209
Liberia, N.E., 636
Morocco : Erfoud, 209
Nyasaland : Lower Shire District, 208
Portuguese East Africa, 675
Rhodesia, Southern, 800, 802
Sudan : Importation of and Preventive measures, 207
U.S.S.R., First Case, 677
Molluscs, Effect on, of " Winter Rotation " of Water in Egypt, 674
RECTAL, Clinical Aspect, 676
Eosinophile Appendicitis and, 677
Schistosoma associated with
Cercariae of, with Four Pairs of Flame Cells, 674
Cercaria sudanensis No. 4 to 8 from Sudanese Molluscs, 210
haematobium, aberrant form, 674
Infection, Rectal Schistosomiasis due to, 209
japonica Infection, Experimental, Histology in, 676
Molluscan Host of : Philippines, 210
Treatment by Fouadin, 676
mansoni, Cercariae of : Sudan, 210
Miracidia of, Susceptibility of, to Salts and pH, 676
Surgical Conditions complicated with, 210
Treatment
Bismuth (Neotrepol), 675
Fouadin, 675 *bis*
Pot. Ammonium Tartrate, 675
Tartar Emetic (fatal), 43
SPARGANOSIS : D.E.I., 216
STRONGYLOIDOSIS
Strongyloides genus, studies on, 224
Human and Primate Species, Instability of Types, 694

Helminthiasis—*cont.*
STRONGYLOIDOSIS—*cont*
Treatment by Di-Hydranol, 260
in the Yaeyama Archipelago, 224
Syngamus laryngeus Infestation in Man, 711
TAENIASIS
Experimental, Blood Changes in, and Clinical Symptoms, 214
Multiple, 215
Taenia saginata, as Test in Study of Anthelmintics, 682
solium Infection in China : rare, 215
see also CYSTICERCOSIS *and* ECHINOCOCCOSIS
Ternidens deminutus in Man, S. Rhodesia, 802
Titles of Unnoticed Papers, 231, 711–13
TRICHINIASIS, Experimental, in Monkeys, 225
Intradermal Test in, 694
Trichinella, Distribution of, in Palestine, 214
spiralis, Development of, in Gut of Host, 695
Young Muscle, Development of in Host, 695
Trichostrongylus Genus, Critical Studies, 224
TRICHURIASIS
Treatment
by Hexylresorcinol, 204, 692
by Higuerolatex, 692
Trichuris Diarrhoea, 225
UNCINARIASIS, *see* ANKYLOSTOMIASIS, *supra*
Worms : Instructions for Collectors, 207
Wuchereria, *see Filaria supra*

Japanese River Fever, *see* Tsutsugamushi, *under* **TYPHUS AND UNCLASSED FEVERS**

Jaundice, Infectious, *see* **LEPTOSPIROSIS**

KALA AZAR (Leishmaniases, all forms), 318–326, 752–6
Blood in, Peripheral, Free Leishmania in, 321
Bone Marrow in, 34
Book on, reviewed, 573
CANINE
Dermal, with Fusospirochaetosis, 325
Diagnosis of, 754
Clinical, 326
Spleen Puncture, etc., Technique of, 324
Incidence
Algiers, 325
France : Marseilles District, 323
Nice, 323
Italian North Africa, 326
Italy : Sardinia, 319
Spain : Madrid, 754
Leishmania in, Cutaneous Localization of, 323
in a Cat : second record of, 752
DERMAL OR CUTANEOUS
Atypical form resembling Leprosy, 755
of Eyelid, 756
Immunization against : Baghdad, 326
Incidence
Algeria, 326 *ter*, 756
Iraq, Baghdad, 326
Italian North Africa, 326
Italy : Abruzzo, Endemic Focus in, 756
Sardinia, 319
Syria : Aleppo, 324

Kala-Azar—*cont.*
DERMAL OR CUTANEOUS—*cont.*
Pathology, 642, 643
Treatment, for Anaemic Patients, 755
Berberine and Berberine Sulphate, 42 *bis*, 755
Camphor Ointment, 755
Cryocautery, 324
Fouadin, 324, 325
Neostibosan, 326
Diagnosis by
Antimony Test, 319
Neostibosan, 319, 754
Serological Reactions, 753
Epidemiology of (*see also* Incidence, *infra*) 752
Goats and, 318
Incidence
Arabia, 755
Brasileno-Paraguayan Frontier, 802
France, 752
Indigenous, 752, 756
Pigmentation in, 752
Hydra, Isle of, 321
India: Calcutta, 753
Italian North Africa, 326
Italy: Sardinia, 319, 326
Palermo, 753
Malta, 320, 753
Spain, 319 *ter*, 752
Jaén Province, 756
Jaundice in, 320
Leishmania
Culture of, in Goats' Milk, 318
on Solid Medium, 322
Differentiation of by
Lytic Action of Specific Sera, 322
Noguchi's Technic for Specific Agglutination, 322
in Dogs, Cutaneous Localization of, 323
donovani, Experimental Infection with, of *Cricetulus migratorius*, 754
Free, in Peripheral Blood, 321
Malaria Associated with; Spain, 319
MUCO-CUTANEOUS, American, or Espundia
Incidence
Arabia, S.W., Uplands of, 755
Costa Rica, 591
Pathology, 642, 643
Treatment
Eparseno, 325
Fouadin, 253
Phlebotomus major, as Vector of Mediterranean form, 318
Titles of Unnoticed Papers, 326, 756
Transmission by Phlebotomus spp., 318
Treatment by
Neostibosan, 320–1
Novostiburea, 753
Stibenyl, 321
Tartar Emetic, 320–1, 753
Urea Stibamine, 321
Typhoid infection curing, 752
Van den Bergh Reaction in, 320

Kedani, *see* Tsutsugamushi, *under* **TYPHUS AND UNCLASSED FEVERS**

LEPROSY, 232–44, 551–62
in Africans, Diagnosis and Treatment, 556

Leprosy—*cont.*
Anaesthesia of, Effect of Iodized Hydnocarpus Esters on, 557
Arrest of, after Treatment, 236, 552
Spontaneous, 555
Blood in, Acid-fast Bacilli from, 558
Blood Serum in, Calcium Content of, 241
Erythrocyte Sedimentation Phenomena, 559
Nitrogen and Sugar in, 559
Thick Drop Method of Examination, 242
British Empire Leprosy Relief Association: Report (1932), 551
Indian Council of, Annual Report (1932), 553
in Children, 232, 234, 235, 241, 551
Neglect of, 552
Complement-Fixation Reaction with Tubercle Antigen, 241–2
Diagnosis, 554
in Africans, 556
Early, Importance of, 552, 554
Histamine Test for, 560
Intracutaneous Tests for, 241, 561 *bis*
Serological: Methods Compared, 240, 558
Epidemiology of (*see also* Incidence, *infra*) 235
in Surinam, 555
Etiology, 235
Experimental, 238, 239 *bis*, 240, 241, 242
Lipoid Activity of Rat Tissues in, 240
General Management of, 554
Histamine Test in, 560
Immunity, Leprolin Vaccination to induce, 241
Racial, 552
Incidence, all forms
Belgian Congo, 232 *ter*
Katanga, 234
Brazil, 243
British Solomon Islands, 234
Ceylon, 551
Cook Islands, 798
Dutch East Indies, 642
Estonia, Spread of, Methods of, 233–4
Federated Malay States, 234
Fiji, Report on Central Leper Hospital, Makogai, 233
Guiana, British and Dutch, Modern Methods in, 234, 235, 551, 554, 555
India, 232, 552 *bis*
Areas of Highest and Lowest Prevalence of, 233
Bhutan, 552
Mission to Lepers: Report, 552
Relief of: Suggested Policy for Authorities, 553
Sample Surveys of, 233
Travancore: Sex and, 232
Unsuspected Cases, 553
Ivory Coast, 243
Japan, 551
Korea: Occupational Therapy and, 243
Nauru (graph), Control of, 627
New Caledonia, 562
New Hebrides, 251
Nigeria, Southern; Itu Leprosy Colony, 235
Philippine Islands, 236, 237
Rodrigues, 629
Southern Rhodesia; Gutu Province, 551
Surinam, *see* Guiana, Dutch, *supra*.

Leprosy—*cont.*
Incidence—*cont.*
Tanganyika, East, 234
Togo, North, Kabré Country, 554
Leper-susceptibility to Rat Leprosy Bacillus, 242
Leprolin Test, 241 *bis*
Leprosy Review (1932), 234–5 (1933), 551
Lipoid substances in Leprous Tissues, 240
Monkeys, Attempted Infection of, 558
Mycobacterium leprae
Cultivation of, 253, 558–9
by Koulecha's Method, 238 *bis*
by Löwenstein's Method, 258, 559
by Shiga's Method, 238–9
Elimination of, by Skin Desquamation, 555
Fatal Infection with, in Rats, 239
Non-acid fast Stage of, as probable Cause of the Disease, 235, 239, 241
Permeability by, of Gut of Young Rats, 239
Ultra-Virus stage in, 235, 239, 241, 562
Pathology of: Summary of recent Work on, 243
Pot. iod. Test for, 552
Present Knowledge of, 243
Prophylaxis
Antileprosy Campaigns
British Guiana, 551, 554
Japan, 551
Clinics and, 553 *bis*
Control Measures in
Africa, 566
Belgian Congo, 232
Dutch Guiana, 234, 235
Cost of, in British Guiana, 551
Leprolin suggested for, for children, 241
Nauru Island, 627
Segregation, 236
Pulmonary, 553
Quiescent Cases, 236, 552, 553
Racial Immunity, 552
Rat, Experimental Transmission to, 239 *bis*
Relapse Cases, 237, 552
Researches on, 558
Skin Lesions, Changes in, following treatment, 557
Skin Reactions for, 561 *bis*
Stages of, Biological Classification of, 555
Tissues of Lepers, Lipoid Substances in, and Positive Serum-Reaction, 240
Titles of Unnoticed Papers, 244, 562
Transmission of, 233, 235
experimental, to White Rat, 239
Treatment by
Alepol, 234, 235, 554
in Africans, 556
Bismuth, 556
Carbon Dioxide Snow, 642
Post-mortem Findings, 558
Chaulmoogra Oil, 554, 556 *bis*, 557
Changes in Skin Lesions and Anaesthesia following, 557
Gold Salts, 556 *bis*
Hydnocarpus Oil, 554, 557
Intradermal, 552
Iodized Oil Derivatives, 242–3, 557
Käyser's Views on, 642
Leprarsol, 243
Mercurochrome, 552

Leprosy—*cont.*
Treatment by—*cont.*
Mercury Cyanide, 556
Occupational, 243
Plants used for, 243
Solganol, in Eye cases, 235
Tartar Emetic, 556
Trypaflavine, 556
Ulcers of, 552, 558
Treatment by Periarterial Sympathectomy, 558
Trophic, 552
Rat
Bacillus of, Cultivation of, 239
Resistance of, to Acids and Alkalis, 562
Susceptibility to, of a Leper, 242
Experimental, Lipolytic Activity of Rat Tissues in, 240
Treatment, 242, 561
Titles of Unnoticed Papers, 244, 562

LEPTOSPIROSIS, 15–18, 368–73, 724
Diagnosis, 368, 369, 724
of Sumatran Infections, 368
Experimental in
Guinea-pigs; Java, 16
White Mice, 371
Incidence
Cochin China, 724
Colombia, Epidemic, 30
Dutch East Indies
Java, in Rats, 15
Sumatra, 368, 369
Germany, Freiburg i. Br., 16
Greece, 15, 369
Cephalonia, 15
Syra, 15, 369
Philippine Islands, 18
Leptospirae = Spirochaetae
Bismuth, Action of, on, 370
Cultivation of, pH Requirements for, 16
icterohaemorrhagiae
Kid, Susceptibility of, 18
Mice, Field, Susceptibility of, 369
White, Susceptibility of, 371
Pig, Susceptibility of, 18
in Rats, Athens and Syra, 15
Bandoeng, Java, 15
Freiburg i. Br., 16
Saigon, 724
Sheep, Susceptibility of, 18
Spermophile, Susceptibility of, 18
in Urine, Intracellular Form of, 370
pseudoicterogenes, Leiden Strain, 372
Rat Strains, Changes in, during Culture in Water, 16, 371, 372
Spirillum cardiopyrogenes, 17
Virulence of, Changes in, during Culture in Water, 16, 371, 372
Duration of, 372
to Guineapigs in Java, 16
Water Leptospira
in Bandoeng, Non-pathogenic to Guinea-pig, 15
in Freiburg i. Br. 16
Meningeal, Experimental, 18
Slime Fever, Experimental, in Man, 17
Spirillosis, New ? D.E.I., 17

Leptospirosis—*cont.*
Spirochaetosis icterohaemorrhagica or Weil's Disease
as Occupational Disease, 370
Serum Reactions in Long Recovered Cases, 724
Titles of Unnoticed Papers, 18

Lymphogranuloma inguinale, *see* **CLIMATIC BUBO**

MALARIA, 61–96 (Critical Review, 193–202); 458–502, 819–71
Acid-Alkali-Equivalence in, 87
Aeroplanes in Control of, 45, 472
Age and Infection Rate: Suliman, *table*, 822
Albuminuria, transitory in, 474
Anopheles in association with
aconitus, Hyderabad (Deccan), 461
Age of, Determined by Size of Oviduct, 304
albimanus, Panama, 862
at Amoy, 69
Andrephilous, 301, 468, 609, 831, 835
barbirostris
Malaya, 495
" Black Spores " of Ross in, 737
Breeding-places of, 293, 305, 462, 493, 608, 613
Control of, *see* Prophylaxis *infra*
costalis, 301, 302
and *A. funestus*: Sierra Leone, 301, 302
Infection Rate, Uganda, 67, 609
Transport of, from Africa to Brazil, 825
culicifacies: India
Hyderabad (Deccan), 461
Northern Sind, 460
Density, Infective, as indicating Risk of Inoculation, 466; *graph*, 467
Dissected, Preparation of, 304
Dutch East Indies, 463
elutus: Age of, how determined, 304
Behaviour in relation to Housing and Malaria, 834
Food-preference of, at Various Seasons, 468, 834
Greece, 823
Italy, 832
Experimental Infection, 458
funestus, 303
and Allies: Transvaal, 608
in Greece, 823
Infection Rate in the Terai, 835
in Uganda, 67
Sierra Leone, 301, 302, 466
var. *leesoni*, Non-andrephilous, Transvaal, 608
of Gabon, 461
gambiae, *see Costalis supra*
House haunting
Nigeria, Southern: Sex Ratio, 468
Sierra Leone: Diseases Spread by: Control, 301
Uganda, Natural Infection in, 67
hyrcanus, Federated Malay States, 638
Biology, 834
Varieties, 835
var. *sinensis*, China and Far East, 69, 610, 649
India: Hyderabad (Deccan), Control, 461

Malaria—*cont.*
Anopheles in association with—*cont.*
Indochina, Maxillary Index and Infectivity of, 610
Infective Density as Basis for Assessing Risk, 466, *graph*, 467
Infectivity of, Sergent's Method, 835
Larvae of, Destruction of, *see* Prophylaxis, *infra*
ludlowii: India, Calcutta, 64
Java: Batavia, 821
Malaya: Control, 494
maculatus: Malaya: Control, 494, 638, 864
Possible Transmitter in Tonking, 462
maculipennis, Andrephilous and Zoophilous, 831, 833
Breeding-places of, 613
Characters of, 612, 613 *bis*, 825
Correlation of Races, Attempted, 831
Differentiation of, Bearing of, on Malaria, 70
Egg-pattern of, 611, 612, 823, 832, *graph* 833
Gonotrophic Dissociation in, 605
Incidence
Algeria, 611
Greece, 823
Holland, 70, 612
Italy, 831, 867
Rumania, 822
labranchiae, 70, 612, 825, 831
Larvae, Destroyed by Gambusia; Algeria, 300
messiae, 70, 612, 825, 831
Morphology of French and Algerian, 611
Passage through, of *P. ovale* and Transmission by Bite, 74
Races of, 605, 611, 612, 613, 823, 825, 831, 833
Reactions of, to Temperature and Atmospheric Humidity, 609
Sexual Behaviour as a Genetic Character in, 305
Wing length, 613, 832
Malayan, 607
Control and Distribution of, 494 *bis*, 495, 607
Manipulation and Conservation of, 303
mauritianus:
House-haunting varieties: Nigeria, 305
Sierra Leone, 301
Tauorga Oasis, 466
var. *ziemanni*, Uganda, see Erratum, iv
Maxillary Index and Infectivity, 610, 613, 614
minimus: Amoy, 69
Assam, 88, 459, 820
Breeding-places of, Hydrodynamics of, 608
Larvae of, in Wells: Philippines, 305
multicolor: Larvae in Saline Water, 296
Periodicity of Various: Nigeria, 67
Philippines, Stream-breeding, 303, 462
philippinensis: Bengal, 65
punctipennis: Experimental Infection of, with Quartan, 85
quadrimaculatus, Experimental Infection of, with Quartan, 853
P. vivax Transmitted by, 471
Rearing in Captivity, 304

Malaria—*cont.*
Anopheles in association with—*cont.*
Screening against, 65
of Siam, in relation to, 68
of Sierra Leone, House-haunting, 30
Steamer, Conveyance by, 825
Stephensi: Salivary Gland Infection, in Calcutta: Influence of Temperature, 458
Stream-Breeding, Larval and Adult Densities in Philippines, 303, 462
tarsimaculatus, Trinidad, Breeding places of, 293, 294
Terai Area, Darjeeling, Sporozoite Rate, 835
Transmission by, of Inoculation Malaria, *see under that head*
of Trinidad: Breeding Factors, 293
of Uganda, Domestic, 67, 608
umbrosus, Malaya, 494, 495
Not a Carrier, Assam, 820
vagus (*formosaensis*): Larvae: Tainan, 610
Walkeri, Vector of *P. vivax*, 488
Water-hyacinth as fostering Breeding, Hyderabad, 461
Wing-length and, connection between, 832
Zoophilous, 831, 833
Anophelism without, 63, 609, 832
in Holland, 612 *bis*
in Italy, 831, *graph*, 832
in Russia, Sub-Carpathia, 71
Antibodies, Parasiticidal in, Demonstration of, 859
Avian
Bleeding Time in Canaries, 492
in Common Fowl, Behaviour of, 735
Culex pipiens Susceptible to Infection with, 179
Erythrocytes, Electric Charge of, 830
Immunity in, 828
Parasites of, Drug-Testing on, 842
P. praecox, Fertilization of, 735
Sexual Cycle, Effect on Drug Resistance, 860
P. relictum, Attempted Filtration of, 491
Prophylaxis in Sporozoite Infection of, 491
Treatment by
Aminoquinoline-8 Derivatives, 849
Fourneau 710, 200
Ichthargan, 85
Plasmoquine, 193, 491, 492
Quinine-Weil, 38
Totaquina compared with Quinine and Hydroquinine, 848
Blood in
Parasite Counts, 74
Reticulocytes in, 488
Blood Plasma in, CO_2 Content in, 87
Blood-Serum in, Albumin-Globulin Ratio of, 487
Blood-Sugar Concentration in, 86
Bone Marrow in, 33
Canal Formation in India, Principles of, 472
Carbonic Acid in Culture of *P. falciparum*, 488
Carriers, Quininization of, Rumania, 822
Cerebral Changes in, 837
in Children, Symptomatology of, 75
Quininization, 482
Cultural and Enumerative Methods, in Clinical Studies by, 73, 74

Malaria—*cont.*
Cultures, Carbonic Acid in, 488
Clover and, 73
Congenital, 474, 475
Diagnosis, Adrenalin Injections in, 859
Differential, of Acute Abdominal, 76
Henry's Reaction in, 88, 482, 483 *bis*, 485, 827, 854, 855 *ter*, 856, 857
Thick Film Method, 62
Drug Prophylaxis, 82, 481
Economics of, 459, 460
Epidemiology of (*see also* Incidence, *infra*)
Advances in, 825
in Dutch East Indies, 463
Gastralgia and Oral Aphthae with, 499
Henry's Reaction, *see* Diagnosis, *supra*
Hypocholesteraemia in, 859
Immunity, Acquired, 827
and Phagocytosis, 829
Species, 71
Studies of, 831
Incidence
Adriatic Islands, 865
Africa, Equatorial (Quartan and Benign Tertian), 469 *bis*
Algeria: Epidemics, 68
Pasteur Institute Report (1932), 827
America, Tropical, 30 (*table*), 31, 61 *bis*
Ceylon, 868
China, 92, 649
Amoy: Transmission, 69
Congo, 846
Belgian
Ituri Forest, in Pygmies and Ordinary Natives, 821
Katanga, 482
French
Brazzaville: Increase, 461
Czechoslovakia, 71
Deltas, 62 *quat.*
Don Valley, 82
Dutch East Indies
Epidemiology, 463
Java, 70, 821
Federated Malay States, 638
Annual Report of the Malaria Advisory Board (1931), 68
Formosa, 81
French Indo-China
Tonking, 462
Endemic: Spleen and Parasitic Indices, 821
Gabon, 461
Georgia, Species Immunity in, 71
Greece: Anophelism and, 823
Guiana, British, in River Areas, 464
Quartan, 97, 499
Holland, 70
Report on (1930–1), 72
India, 495
Assam: Jorhat District, 820
Malarial Control in, 88
South Sylhet, 64
on Tea Estates, 64, 459
Bengal
Calcutta, 63, 844
Northern, on Tea Estates, 459
Seasonal Incidence of each form (*chart*), 66

Malaria—*cont.*
Incidence—*cont.*
India—*cont.*
in British Forces, 634, 836, 846
Burma : Mingaladon Cantonment, 67
Darjeeling Terai, 835
Deccan : Hyderabad, 461
Kamptee, 89
Patiala State, 64
Railway Prophylaxis, 65
Sind, Northern, Epidemic 1929, 460
Italy, 82 *sqq.*
Agro Romano : 473, 498, 866, 867
Gorino, 832
Sardinia : Influence of, on Decadence of, 824
Japan, 464
Liberia, 844, 863
Macedonia : in French Forces, 90
Malaya, 68, 89, 494 *bis*, 495, 638, 834, 843
Natal, 863
New Hebrides, 251
Nigeria, Southern, 468
Palestine, 468, 834
Panama Canal Zone, 471, 631, 862
Philippine Islands, 462 *bis*
Portugal : Benavente, 497
Rhodesia, at Copper Mines, 493
Southern, 799, 800
Rumania, 490
Gurbanesti, Suliman, 822
Senegal : Dakar, 474
Siam, 68
Sierra Leone, 467, 482
Quartan, 469
Somalia, 68
Spain, 91
Guadalmello Swamp, 468
Tripolitania, 466
Tunisia : Cap Bon, 461
Uganda, 67, 608
U.S.A.
Alabama, 480
in the Army, 470, *chart*, *ib.*
California, Quartan, 479
New Mexico, in Irrigated Regions, 819
S.E. States : Recent Distribution in, 464
U.S.S.R. : Azerbaijan, 465
World Prevalence, 477, 478
Incubation, Prolonged, in the Light of Henry's Reaction, 855
Inoculation Malaria
Asexualization of the Plasmodium in, 87
Controlled Technique for, 489 *bis*
Fundamentals of, 73
Henry's Reaction in, 485, 856
Paroxysms, Blood Injections to Provoke, 853
Purpura haemorrhagica following, 473
Selection of Strain for, 853
Termination by Cardiazol-Quinine, 490
with the Three Species of Parasites, 490
Transmissibility of, by Anopheles, 826, 827
Treatment
Anopheles as used in, 303, 825
Introduction of Mosquito Sporozoites, 852 *bis*
for Various Diseases, 490

Malaria—*cont.*
Inoculation Malaria—*cont.*
White and Differential Counts in Six Cases, 85
Kahn Test in, 500
League of Nations : Malaria Commission's Report on Therapeutics, 837, 842
Malariology Course, Pasteur Inst. Algeria, 472
Microgametes
Infectiousness of, in Infected Man, 471
Monkey, Attempts to infect with Human Malaria, 854
Monkey Malaria, Experimental
in Africa, 732
Atebrin in, 492
Intradermal Reaction in, 492 *bis*
Studies on, 86
Superinfection with Various Strains, 831
Nephritis, *see* Quartan
Nuclear Reaction in *L. malariae* and *Proteosoma praecox*, 87
Plasmodium (ia) associated with
Action on, of Atebrin, 79
Asexualization of, in Inoculation Malaria, 87
Biology of, 86
in Cerebro-Spinal Fluid, Behaviour of, 487
Enumeration of, in Patients' Blood, 74
falciparum, Cultures of, Carbonic Acid in, 488
Development of, 734
Immature Crescents and Dark Rods in Erythrocytes, 735
in Kenya, 733
Nuclear Reaction in, 87
Filtration Experiments, 487, 857, 858 *bis*
Incidence of, in River Area, British Guiana, 464
malariae : in Freetown, Sierra Leone, 469
Nuclear Reaction in, 87
Microgametocytes of, Exflagellation of, 854
ovale, Cases of Malaria due to, 835, 838
in Man and Mosquito, 74, 733
Phagocytosis of, 829
Species Present at Different Ages, 469, 823
Sporozoites, Attempts to Infect Monkeys with, 854
Staining Methods for, 87, 488, 489 *bis*
Intra-Vital, for Phagocytosis, 830
Vital, 488, 734
vivax, Acquired Tolerance to, 471
Anopheles Walkeri as Vector of, 488
Mitochondria in, Vital Staining, of, 734
Premunition in, 490, 828
Prophylaxis
Algae-Freeing of Swamps and Fish-ponds, Jamaica and Batavia, 820, 821
Anti-Gametocyte, only, 861
Antimalarial Campaigns and Measures in Various Countries, 30, 45, 61, 88, 463, 466, 473, 493, 494 *bis*, 495, 497, 498 (*diagram*), 573, 605, 631 (*chart*), 632, 634, 820
Atebrin, 481, 838, 839, 863 *bis*
Bird Lime for Killing Mosquitoes, 45
Book on, reviewed, 573
Borrow-Pits and, 300

Malaria—*cont.*
Prophylaxis—*cont.*
"Causal" and "Clinical," 838, 839
Drainage, 631, 820
Canal Projects, 472
in Georgia, by Convict Labour, 826
Subsoil, 493
Drug, 82
Critical Article, 193 *seq.*
Housing, Suitable, 826
Larvicides
Gambusia, 299, 300, 819, 827, 866
Biology of, 865
Girardinus guppyi, Acclimatization of, in Tonking, 804
Oiling, 820, 827
Aeroplane, Use of, 45
and Dusting compared, 299
and Economy, 494, 495
Seasonal, 89
of Slow-running Water, 300
Paris Green, 62
Aeroplane, Use of, 472
Automatic Distribution of, 864
Charcoal as Diluent for, 45, 606
Improvement of Methods, 606 *quat.*
in Malaya, 864
and Oiling compared, 299
Mines, Control on, 493
Plasmoquine in, 480 *bis*, 862
in Benign Tertian, 89, 824
in Troops on Service, 862
Value of, 860
Pumps, Portable, 89
Quininization
Chemical Control of, *chart*, 91
of Children, 482
Quinoplasmine, 481
Quinoplasmoquine, 861
Railway: India, 65
Rice-Cultivation and, 70
River Sand Silting, 64
Salt Water Ponds and, Treatment of, D.E.I., 821, 822
Screening, Materials for, 495, (*table*) 496
Size for Apertures, 65
Sulphur Ingestion, 500
Zooprophylaxis in Agro Romano, 866, *sketch map*, 867
Quartan
and Benign Tertian, in Equatorial Africa, 469
Experimental Infection with, of *A. punctipennis*, 85
of *A. quadrimaculatus*, 853
Nephritis, Malarial, in, 75, 97, 499
Quinine Excretion in Urine of Patients, 82
Requirements of Malarial Countries, 477, 478
Reactivation of: Recent Methods, 473
Relapses in, 91, *fig.* 470
Salt-water Fish-ponds and, 821, 822
Sera: Ultraviolet Absorption Spectra of, 65
Spleen-Rate as Index to Malarial Intensity, 468
and Splenectomy, 75
Splenomegaly of, Race Influence on, Panama, 471
Subtertian, Aestivo-Autumnal, Malignant Tertian, or Pernicious

Malaria—*cont.*
Subtertian, etc.—*cont.*
Parasite of: Kenya, 733
Plasmoquine as Prophylactic in Liberian Natives, 480
Polyneuritis in, 868
Severe, Fatal, 474
Symposia on: 76, 825
Synthetic Antimalarial Remedies and Quinine, 76
Tertian, Benign
Acquired Tolerance to, 471
Chronic, Treatment with Plasmoquine and Quinine (*table*), 475
Clinical Characters of, in relation to Dosage of Sporozoites, 852
due to *Plasmodium ovale* n. sp., 835, 838
Experimental Epidemic, 824
Incubation Period, Extrinsic, Influence on, of Temperature, 471
Microgametocytes as Factor in Human Infectiousness, 471
Plasmoquine Prophylaxis in, 89, 824
Therapeutic, *see* Inoculation Malaria, *supra*
Titles of Unnoticed Papers, 92–6, 500–2, 868–71
Training Courses in Malariology, Book on, reviewed, 410
Treatment, New Drugs in, (Critical Review), 193–202
Principles of, Report by L. of N. Malaria Commission, 837, 842
Uninterrupted, 478
Various Methods:
Atebrin, 80 *bis*, 198–200, 476 *bis*, 638, 843 *bis*, 844 *ter*, 868
Action of, on Plasmodia, 79
of African Children, 80
in Benign Tertian, 81
Deaths possibly due to, 845
Effect on Heart Muscle, 845
Field Tests of, F.M.S., 638
and Plasmoquine combined, Toxic Effects [M.T.], 475, 846
in Subtertian, superiority over Quinine, *graph*, 840
in Tropical America, 61, 80, 81, *graph* 840
Wood Light for demonstrating Excretion of, 845
Autohaemotherapy [M.T.], 851
Chinoplasmin, 475
Cinchona Febrifuge for Children, 846
Diethanol dihydro quinamine, 851
Drugs, New, (Critical Review), 193–202
Erion *see* Atebrin, *supra*
Fourneau 574 with Quiniostovarsol, 479, 850
Formula, 850
Fourneau 710, 84, 200–1
Formula, 850
with Quinine [M.T.], 84
with Quiniostovarsol, Efficiency of, 201, 478, 479
Toxic Effects, 84, 201
Fourneau 915, a New Drug, 850
Hydrocinchonidine and Hydrocinchonine, 849
Hydroquinidine, 479, 841

Malaria—*cont.*
Treatment—*cont.*
Various Methods—*cont.*
Plasmoquine, 81, 82, 193–198
Action on Uterus, 868
Gametocidal Action of, 85, 860
L. of N. Report on, 838, 840
Minimal Effective Dose, Attempts to Ascertain, 634
and Quinine, 81 *bis*, 846, 868
Five Days' Treatment [Q.], 81
Structural Formulae of, 194
Toxic Action of, 195, 477
Plasmoquine Compound Tablets, Passage of, in Stools, 81
Quinetum, 62
Quinidin Sulphate in, hypersensitiveness to Quinine [Q.], 479
Quinine, 90, 840
Administration of, Parenteral *versus* Oral, 847
for Children, 846
Derivatives, New, Gametocidal Action of, 850
Drugs containing, 201
Idiosyncrasy in, 40, 479, 654
Injection, Calcareous Infiltration of Soft-Parts after, 40
Modified Taiwan Method in Various Forms of, 81
Panama, in Villages, 862
and Quinine Compounds, 62 *bis*
Quininization, Chemical Control of, 91
Quiniostovarsol, 62
and Fourneau 710, 478, 479
Quinoplasmine, 62
Quinoplasmoquine for Carriers, 822
Serotherapy, Attempted, 851
Synthetic Drugs, 76 *sqq.*, 480
Tebetren, 84
Totaquina, 77, 841
in Avian Form, Comparative Toxicity and Efficiency of, 848
Preparation and Standardization of, 77, 847
and Tuberculosis, relations between, 648
Ultraviolet Absorption Spectra Studies, on Malarial Sera, 65
Urine, Quinine Excretion in, 82
Urobilinuria in, 474
Wassermann Reaction in, 499
World Prevalence in Relation to Quinine Needs, 477, 478

MEDICAL ZOOLOGY, 177–84, 291–317, 604–22, 726–38.
Aëdes aegypti (*argenteus*) *see under* **YELLOW FEVER.**
detritus, Bites of, 298
scutellaris, controlled by *Megarhinus splendens*, 179
zammitti, Larvae of, in Salt Pools, 296
Amoebae, *see under* **AMOEBIASIS**
Anopheles, *see under* **MALARIA**
Ants, Bug Extermination by, 620
Apiochaeta scalaris, Intestinal Myiasis due to, 311
Argas pipistrellae, Skin lesions due to, 620
Arthropods, Use of, in Medicine, 604

Medical Zoology—*cont.*
Balantidiasis, see under **DYSENTERY,** CILIATE
Bartonellosis
Acute, of Intact Mice, 738
Book on *Bartonella* reviewed, 572, 818
" Black Spores " of Ross in Malarial Mosquitoes, 737
Black Widow Spider, see *Latrodectus mactans, infra*
Bedbugs, *Cimex lectularius* and *C. rotundatus*, Resistance of, to Ethylene Oxide, 180
Belgian Congo, Blood-sucking Insects and Ticks in, 292
Book on Medical Entomology, reviewed, 327
Boophilus sp., Skin Lesions due to, 620
Bot-fly Larvae, Creeping Eruption due to, 616
Bufo regularis Venom, Effects of, on the Eye, 184
Bugs, Extermination by Ants : 620
Ceratophyllus fasciatus of Toulon Rats, 640
Chaetopods in relation to Man, 711
Chara fragilis, in relation to Mosquito Breeding 298
Chloropicrin and Carbon Bisulphide in Control of Mosquito Larvae and Pupae, 606
Cimex lectularius, Effects of Temperature and Humidity, 316
and *rotundatus*, Resistance of, to Ethylene Oxide, 180
Climatic Conditions as affecting Insect Populations, 291
Councilmania lafleuri as synonym for *Entamoeba coli*, 178
tenuis and *Endolimax nana*, Comparison, 178
Culex aegypti, Nomenclature of, 614
fatigans, and *Chara fragilis*, 298
Larvae, Destruction by Paris Green, 606
pipiens, Bionomics of, 306, 610
Culicosis bullosa from Bites of, 307
English, susceptibility of, to Bird Malaria, 179
Oviposition of
Influence on, of Temperature, 604, 605
Without Blood Feed, 604
Rearing of, 307
Roubaud's Autogenous Race, 306
quinquefasciatus, Feeding Habits of, 606
Culicidae, House-haunting, Sierra Leone, 301
Culicine(s), Breeding in Salt Water, 296
Malayan, 607
Culicoides : Bahamas, 308
furens, Bite of, Deterrents for, 308–9
in Salt Marshes : U.S.A. littoral, 614, 615
Culicosis bullosa, 307 *bis*
Daboia Venom, see Russell's Viper Venom, *infra*
Demodex folliculorum, Facial Dermatitis due to, 621
Dermanyssus gallinae, Effect of, on Human Skin, 621
muris, on Ship Rats, 640
Diptera of Medical and Veterinary Importance, 309, 615
Echinophaga gallinacea of Rodents : Dakar, 619, 620

Medical Zoology—*cont.*
Ectoparasites of Live Animals and Birds, Method of Collecting, 292
of Toulon Land Rats, 640
Endolimax nana, Budding and other Variations in, 178
Eratyrus cuspidatus, Rearing and Study of, 315
Erythrocytes containing Immature Crescents, Curious Bodies in, 735
Eye Gnat of California, 309
Fleas, in House and on Rodents, Dakar, 619 *bis*
Fleas, Rat
France : Toulon, 640
Senegal : Dakar, 619
in Sandy Floors of Huts, Disinfection against, 46
Gastrophilus intestinalis Larva, Creeping Eruption due to, 616
Giardiasis *see under* **DYSENTERY,** FLAGELLATE
Glossina, *see under* **SLEEPING SICKNESS**
Guineapigs, Action on, of Ethylene Oxide, 180, 181
Hematopinus spinulosus of Rats, 640
Hippelates pusio, 309
Humidity as affecting Insects, 292
Hylesia sp. Moth, Urticaria due to, 317
Insect(s)
and other Arthropods, Use of, in Medicine, 604
Classified as Water-spenders and Water-savers, 291
Populations of, Climatic Conditions as affecting, 291, 292
Latrodectus spp.
Bites of, Symptoms following, 179, 180
hasseltii, Bite of, Poisoning by, 180
mactans, Bite of, Toxin of, 179
Liponyssus nagoyoi, House-infesting Mite, 316, 622
Meal Worms, Human Ingestion of, 317
Medical Entomologist's Report (1931), Nyasaland, 177
Megarhinus splendens, control of, over *Aëdes* sp. Fiji, 179
Micro-climate, Insects in, 291–2
Monomorium pharaonis, Bug-extermination by, 620
Mosquito(es), *see also under Names, and Anopheles, under* **MALARIA**
Air in Oesophageal Diverticula and Intestine of, in relation to Emergence, etc., 297
Airplane Oiling to Control, 45
Bird-lime for Killing, 45
Biology of : Experimental, 604, 605
Bites of, 298
Atypical Reaction, 307 *bis*
Breeding of, and Hydrogen-ion Concentration, 295
in Queensland, *Chara fragilis* in Control of, 298
in Telek Anson, 295
in Trinidad, Physico-Chemical Factors of Water in relation to, 293
Breeding Places, Hydrodynamics of, 608
British Life-History in relation to Anti-larval Control, 605
Hibernation of, 604

Medical Zoology—*cont.*
Mosquito(es)—*cont.*
House-haunting, 301, 305
Larvae of, Paris Green as Larvicide for, 606 *quat.*
and Pupae, Respiration of ; Effects on of Shade, etc., 297
in Salt Water, 295 *bis*
Larvicides, Paris Green, 299, 606 *quat.*
Petroleum Compared with Paris Green, 299
Malayan : Notes on, 607 *bis*
Nuisance of, and its Control : Germany, 298
Pupae, Toxicity to, of Sodium Arsenite, 294
Reactions of, to Temperature and Humidity, 609
Salivary Secretion of, Possible Chemotactic Effect of, on *Microfilaria immitis*, 604
Two Simple Measures against, 300
Moth-caused Urticaria, French Guiana, 317
Musca genus, Revision of, 309–10
Myiasis, Intestinal due to *Apiochaeta scalaris*, 311
Nyasaland, Report of the Medical Entomologist (1931), 177
Ochlerotatus caspius, in relation to *C. aegypti*, 614
Ornithodorus talaje, House-infesting, Panama, 317
Paederus idae, Dermatitis due to, 181
Panstrongylus geniculatus, Rearing and Study of, 315
Phlebotomus-Bite, Effect of, on Human Skin, 308, 615
Phlebotomus papatasii, Biology of, 308
Larval Food of, 308
Plasmodia, *see under* **MALARIA**
Protozoa
Blood-inhabiting, Infection and Resistance in, 726
in Faecal Films : Staining Methods, 727 *ter*
Intestinal in
France, Nord, 726
Hungary, 726
Rats in relation to House-Infestation by Ticks, 316, 317
Recent Progress in Medical Entomology, 292
Rhodnius pictipes, Rearing and Study of, 315
prolixus, relation of, to Humidity 316
Larvae, Bites of, Effects of, 315
Russell's Viper
Antivenin, Standardization of, 182
Venom, Detoxication of, by Hepatic Lipoids, 183
Salt Water, Adaptation of Mosquito Larvae to, 295
Sandfly(ies) (*see also* Phlebotomus), Report on, in Bahama, 308
Salt Marsh, Control-measures for, 614
Trap for, 615
Sarcosporidiosis
in Heart Muscle, 735
in Man, China, 736
in Thigh, 736, 738
Scorpion Stings, Egyptian Drugs as Antidotes to, 50
Snake Venoms in Medicine, 181
Antivenin, Kasauli, 182, 183

Medical Zoology—*cont.*
Spider Poisoning by
Latrodectus hasseltii, 180
Latrodectus mactans, 179
Stegomyia fasciata, see also Aëdes aegypti, under **YELLOW FEVER**
Black Sea Shores, Diseases borne by, 307
Stomoxys Group, Revision of, 310, 616
Synosternus pallidus, House-haunting : Dakar, 619, 620
Tenebrio molitor, Larvae of, Ingested by Man, 317
Theobaldia annulata, 610
Thyridanthrax argentifrons, parasitic to *Glossina*, 314
Ticks : Belgian Congo, 292
Experimental Studies on, 620
House-infesting, Destruction of, 316
Nagoya, Japan, Destruction of, 316, 317
Panama Canal Zone, 317
Transmission by, of Relapsing Fever Spirochaetes, 11
Titles of Unnoticed Papers, 184, 317, 622
Toad Venom, Effect of, on the Eye, 184
Triatomidae, Venezuelan, 315
Trichomonads, Reaction to changes in Culture Media and Temperature, 728
Trichomonas genitalis or *foetus* from cow's Uterus, Cultivation of, 729
parva of Rat, Identity of, with *E. hominis* discussed, 729
vaginalis, Biology of, 729
Trombicula autumnalis in Germany ; Effects of Bite, 621
Trypanosomes, *see under* **SLEEPING SICKNESS**
Tsetse-fly, *see* Glossina, *under* **SLEEPING SICKNESS**
Wohlfahrtia vigil, Behaviour of, 310
Cutaneous Myiasis due to, 310, 316
Xenopsylla astia : Dakar, 619, 620
brasiliensis : Dakar, 619, 620
cheopis : Dakar, 619, 620
of Rats, Toulon, 640

MISCELLANEOUS, 30–54, 248–61, 563–8, 627–55, 798–816
Acid Base Equilibrium in the Tropics, 35
Africans as Medical Assistants, 32
Aircraft Transmission of Yellow Fever and other Diseases, 563, 565, 566
Altitude in relation to Tropical Ailments and to Psychological Changes, 629
Appendicitis, in Fijians, 50
Mechanism of Infection in, 640
Army in India, Health of (1931), 632
Ascites, Causation of, 646
Bacteriophage for Cholera and Dysentery, Preparation of, 253
Blood and Blood Conditions
Anaemias
in Egypt : Causation, 814
Erythroconts in, 51
Megalocytic, 254 *sqq*
Differentiation of, from Pernicious, 254
of Pregnancy, Bengal, 256, 257
Treatment, 258
Sickle-Cell, Various Locations, 48
Arterial Tension of Congolese Natives, 47
Blood-cell Count, Differential, 254

Miscellaneous—*cont.*
Blood Cells, Anisocytosis of, 256
Study of, Technique, 254
Blood Changes at various Altitudes, 629–30
Blood Diseases and Blood Regeneration in Java, 812
Bone Marrow in Tropical Disease, Exam. of, 33
Chemotherapeutic Trials of
Rare Metals, 38
Quinine-Weil in Bird Malaria and Pneumococcus Infection of White Mice, 38
Chenopodium Poisoning, Loss of Hearing after, 42
Children, White, Rearing of, in East Africa, 629, 630
Countries and Places referred to, and Diseases, etc., Prevalent in them
America, Tropical
Diseases Prevalent, 30
Anglo-Egyptian Sudan
Port Sudan, Asthma at, Influence on, of Fungi, 811
Splenomegaly and Infantilism in, 44
Arabia : Yemen Lowlands, Intestinal Parasitism in, 806
Argentina : North Argentine Pathological Society, Report, 253
Australia, Commonwealth of,
Anne MacKenzie Oration, The Conquest of Climate, 803
Belgian Congo
Arterial Tension in Natives in, 47
Diseases Prevalent, 635
Kwango District, Labour Conditions in, 31 *ter*
Medical Assistance in, to Natives, 634
Yakusu : Training and Employment at, of Natives as Medical Assistants, 32
Brazil
Poisonous Fish of, 654, 804
Scrotal Elephantiasis in, 53
Brasileno-Paraguayan Frontier : Diseases Prevalent, 802
British Guiana
Nephritis in, 653
Paratyphoid C in, 52
Ceylon
Health Unit work in, 798
Land-leeches in, 806
China : Wuhan Area, Intestinal Parasitism in, 804, *table*, 805
Colombia : Infectious Jaundice in, 30
Cook Islands, Diseases Prevalent, Superstitions regarding, 798
Dutch East Indies
Hayfever or Pollenosis in, 52
Java
Blood Diseases and Blood Regeneration in, 812
Gastric Ulcer in, 809
Histoplasmosis in, East, 51
Metabolism and Protein Consumption of Europeans at Batavia, 34
Sumatra, E. Coast, Gastric and Duodenal Ulcers in, 46
Rhinoscleroma in, 49
Urine Reaction of Europeans in, 35

Miscellaneous—*cont.*
Countries and places referred to,—*cont.*
East Africa
and Nigeria, Tropical Ulcer in, Treatment by Calcium, 37 *bis*
Problems of White People in, 629
Egypt, Furunculosis in : Cure by Bismuth, 651
Far East : Malaria and Plague in, 649
Federated Malay States : Report of Med. Research Inst., 637
Fiji
Appendicitis in, 50
Central Medical School, 248
France : Senegalese Soldiers in, Diseases prevalent among, 639
French Indo-China
Hué : Splenomegaly at, Treatment by Normet's Citrate Solution, 807
Poulo-Condore : Phagedenic Ulcer in, Treatment with Tartar Emetic, 35 *bis*
Greece : Syra, Nature of Epidemic on, 648
Gold Coast, Accra : Sickle Cell Anaemia at, 48
India
Assam : Glossitis, Exfoliative in Jail Prisoners in, 648
Bengal
Anaemia of Pregnancy in, 256, 257
Splenomegaly in, 43
Bombay
Haffkine Institute Report (1931), 636
Poona : Rhinosporidiosis in Sand-Workers in, 807
Diseases Prevalent in Army Officers and other ranks, 632
Madras : Vizagapatam, Ascites at : Cause of, 646
Shillong : Pasteur Institute Report for 1931, 253
Smallpox in, 566
Splenectomy in, 647
Italy
Sardinia : Diseases Prevalent, 648
Liberia
Diseases Prevalent, 635
Tropical Ulcer in, 636, 645
Malaya : Health and Climate in, 630
Morocco : Casablanca, Pasteur Institute at, 806
Nauru Island
Diseases Prevalent, 627–8
Infant Mortality, Check of (*graph*), 628
Vital Statistics (*graph*), 628
New Hebrides
Diseases Prevalent, 250
Hygiene in, 252
Nigeria : Lagos, Peptic Ulcer at, 810
Pacific area : Bore-Hole latrines in, 249
Depopulation in, Medical Services in relation to, 249–50
Western
Fourth Annual Report of Health Service, 1931, 248–9
Native Medical Practitioners in, 248, 249
Papua : Diseases Prevalent, and Depopulation, 252

Miscellaneous—*cont.*
Countries and Places referred to,—*cont.*
Rodrigues
Diseases prevalent, 628–9
Rhodesia, Southern
Public Health Report, 1932, 799
Russian Turkestan, Bone Marrow in Disease in, Exam. of, 33–4
Senegal
Hut-floors in, Disinfection of, 46
S. Louis : Vital Statistics, 252
Solomon Islands, Tropical Ulcers in
Treatment by
Dickson-Wright Method, 36
Excision and Graft, 644
Syra, Island of, Epidemic on, 648
Togoland : Kabre Country : Vital Statistics, 252
Uganda : Medical Education in, 659
Union of South Africa
Plague among Wild Rodents in, 565
Flea Vectors, 566
Depopulation, Deficiency and Disease, 249, 250, 252
Value of Medical Services in relation to, 249–50
Diagnosis, Differential, of Typhus and Relapsing Fever, 649
Dietaries, Native, 252
Diphtheria : Southern Rhodesia, 800
Elastoplast Dressing of Granulating Wounds and Ulcers, 807
Exanthematic and Relapsing Fevers, Diagnostic Problem Concerning, 649
Fish, Poisonous : Brazil, 654, 804
Food Deficiency in relation to Depopulation, 249, 250, 252
Furunculosis : Bismuth Curative, 651
Histoplasmosis in a Javanese Boy, 51–2
Infantilism, Splenomegaly and, 44–5
Intestinal Infections, Pathogenesis and Treatment of, 640
Jaundice, Obstructive and Haemolytic, in the Tropics, 653
Labour, in Kwango District, Belgian Congo, 31 *ter*
Latrines, Bore-hole, 249
League of Nations Health Organisation, Quarterly Bulletin
Report of Internat. Conference, Cape Town, 1932, 563
Medical Assistants, African, Training and Employment of, 32–3
Melioidosis, *Pf. whitmori* associated with, 638
Mental Diseases : Southern Rhodesia, 799, 801
Metabolism, and Protein-Consumption in Europeans in the Tropics, 34
Mines, etc., Natives working on, Health of : Southern Rhodesia, 801
Missionaries, Invaliding of, for "Nerves," 630, 631
Mosquito Transport by Aeroplanes ; Experiments on, 803
Muco-Cutaneous Affections due to Monilia, Complement Deviation in, 814
Myositis and Pseudo-Myositis, 49
Due to Staphylococci : Pathogeny, Evolution, etc., 808 *bis*

Miscellaneous—*cont.*
Native Medical Practitioners in the Western Pacific, 248, 249
Nephritis, British Guiana, 653
Neurasthenia, Tropical, Examination of, 802
Otitis : Bacteriology : Treatment, 50
Paralysis after Epidemic Poliomyelitis : Nauru, 628
Pharmacology, *see also* Chemotherapeutic Trials
Bael, Active Principle of, 815
Di-Hydranol in Treatment of Intestinal Protozoal Infections in Man, 259
Emetine and Cephaline, Action of, on Cats, 41
Erythraea spicata, and *Mollugo Glinus* as Antidotes for Scorpion Stings, 50
Ipecacuanha, Indian, 41
Quinamine, Action of, on Heart, 815
Quinine-Weil in Bird Malaria and Pneumococcus Infection of White Mice, 38
Rare Metals, Trials of, 38
Thymol, Menthol, and Camphor from Indian Sources : Synthetic Rivals, 42
Poisons and Poisoning
Asp : Treatment, 652
by Intravenous Tartar Emetic, 43
Investigations into : F.M.S., 639
by Ol. Chenop., Loss of Hearing after, 42, 654
Poisonous Fish : Brazil, 654
Rats, Toulon, and their Parasites, 639
Rhinoscleroma : Sumatra, 49
Rural Hygiene in Backward Countries, Recommendations on, 563, 566
Schick Test in Malay Schoolboys, 639
Scorpion-Stings, Venom of
Plant-antidotes, 50
Study of, 636
Splenectomy, in reference to Conditions in the Tropics, 647
Splenomegaly, and Infantilism, 44–5
Tropical, Treatment by Normet's Citrate Solution, 807
Titles of Unnoticed Papers, 53–4, 261, 655, 815–16
Tropical Diseases seen in Home Practice, 635
Medicine, Teaching of, 636
Tumours : Liver Carcinoma, 259
Ulcers
Blastomycetic, 642, 643
Buccopharyngeal, and Skin, Pathology of, 642, 643
Gastric and Duodenal, Sumatra, Pathogenesis of, 46
and the Vegetative Nervous System, 809
and Granulating Wounds, Dressing of, 807
of Leg, Ambulatory Treatment by Strapping, 643 *bis*, 807
Varicose and Indolent, Treatment by Dickson-Wright Method, 36
Peptic ; Nigeria, Lagos, 810
Tropical
B. fusiformis from, Inoculation Experiments with, 643

Miscellaneous—*cont.*
Ulcers—*cont.*
Tropical—*cont.*
Distribution in, of *B. fusiformis* and *Spirochaeta schaudinni*, 642
Etiology, 37
Phagedenic, Treatment by Local Specific Vaccination, 642
by Tartar Emetic, 35 *bis*
Records, Graphic, of, 645
Severe : Treatment, 807
Solomon Islands, 36, 644
Treatment by
Calcium, 37 *bis*
Dickson-Wright Method, 36
Excision and Grafting, 36 *bis*, 644, 807
Tartar Emetic, 35 *bis*
Urine, Morning, under "Basal" Conditions in the Tropics, 35
Vaccination, Percutaneous, with *B. typhosum*, *B. dysenteriae* and *V. cholerae*, 653

Mycology, Tropical, Medical, *see also* **DERMATOLOGY, TROPICAL**
Diseases
Forms present in Argentina, 253
Histoplasmosis : Java, 51
Mycoses, Tropical, Epidemiology of, 53
Valedictory Address on, 642

OPHTHALMOLOGY, TROPICAL, 374–81
Anaesthesia by Avertin in Eye Operations, 378
Blindness in Egypt, 380, 381
Cataract ; Operations for, 376 *bis*
Corneal Scars, Tattooing of, 380
Eyeballs, Blind and Painful, Treatment by Alcohol Injections, 379
in Egypt, Progress in dealing with Eye-disease, 380, 381
Glare, Tropical, Iraq ; Effects on R.A.F., 378
Glaucoma, of Epidemic Dropsy, Operation for, 377
Non-Congestive : Diagnosis and Treatment, 376
Primary Absolute, Treatment by Alcohol Injections, 379
Keratitis due to Caterpillar Hairs, 377
Interstitial : Liberia, N.E., 636
Punctate, Superficial, 375
Lenticonus, Anterior, 381
Onchocerciases, Blindness due to : Gold Coast, 379
Ocular, Belgian Congo, 377
Eusimulium spp. as Vectors of, 377
Ophthalmia nodosa, 377
Ophthalmic Practice : Tropics, Special Features of, 380
Pterygium : Gold Coast, 379
Review of Recent Articles, 374
Sleeping Sickness, Eye-complications in, 378
Spring Catarrh : Treatment by Splenic Extract, 380
Trachoma
Diagnosis, in Early Stages, 375
Diagnostic Signs in, 380, 381
Etiology, 374
Experimental, in Monkeys, 374

Ophthalmology, Tropical—*cont.*
Trachoma—*cont.*
Incidence
America, Comparative Study of, with the Disease in Egypt, 378
Egypt, 378, 379, 380, 381
Fiji, 374
India, in Recruits, 634
Latakia : Agents of Spread of, 375
Noguchi's Bacterium and Researches on, 374
Pathogenic resemblance of, to Tubercle and Leprosy : Treatment suggested, 375
Prophylaxis : Chaulmoogra Oil suggested, 374
Site of Commencement of, 380
Treatment
Chaulmoogra Oil, 374
Comparative, with Acetic Acid and Chaulmoogra Oil, 374
Early, 381
Jacobson's Solution, 380
Xerophthalmia, in Old People, Fiji, 374
Xerosis of Cornea, 376

Pappataci Fever, in British Forces ; India, 632, 633

PELLAGRA, 144–52, 546–50
Alcoholic variety, 146, 152
and Alimentary Disorders, 148-9, 152
Anaemia in, 34
Analysis of Cases, 146
Blood Conditions in
Erythrocytes in, 548
Sedimentation Rate of, in Diagnosis, 147
Blood Picture in, 548 *bis*
Bone Marrow in, 34
Control of, 150–1
Diabetes insipidus in, 148
Diagnosis, Utilization in, of Erythrocyte Sedimentation Rate, 147
Diet in relation to, 151, 546, 547, 549 *bis*, 550
Protein Value of, 146, *table*, 145
" Dopa " in, 149, 150
and Endocrine Disturbances, 547 *bis*
Etiology, 144 *sqq.*
Dietetic Factors in, 549
Review of, 152
Two Groups of Factors, 150
Food Stuffs, certain, Preventive Power of, 151, 547
Food Supply and Incidence of, 546
Improvement, while taking " Pellagra Producing " Diet, 550
Incidence
Egypt, 144, 147
Periodicity of, 149
Rumania, 548
Transcaucasia, 546
U.S.A.
Florida, Family Dietaries and Seasonal Occurrence of, 151
Mortality from, in Wage-earners, Race and Sex factors, 144
South Carolina, 546
and Insanity, Association between, 147–8
Maize in relation to, 144–5, 150
Toxic content of, 145, 150

Pellagra—*cont.*
Pathology, 546
Pigmentation in, 548
Prophylaxis, 150–1
Dietetic, 151, 547 *bis*
Pyschoses of, 147, 148
Secondary, 148–9, 152
Symptoms, 146, 147
Freiburger Complex, 547 *bis*
Titles of Unnoticed Papers, 550
Toxin of, Chemical Nature of, 149
Treatment
Dietetic, 146, 550
Parenteral Liver Extract, 549
Natein, for Secondary, 148
Thiosulphate, 149
for Various Symptoms, 146
Wheat Germ, Intravenous, 549
Vitamin G (B_2) Deficiency
Clinical Aspects, 151–2
Studies on, with Special reference to Protein Intake, 549

PLAGUE, 161–9 (Critical Review, 331–42, 411–422) ; 522–33
Ancient and Modern, Epidemiology of, 529
Bacteriophage, A, Study of, 531
Critical Review on, 331–42, 411–22
Bedbugs, Viability of Virus in, 163
Deaths, Sudden, Exam. of, for Pneumonic, 526
Diagnosis of
Bacteriophage in, 531
by Blood Examination, 166
Epidemiology of, Rat Density as Factor in, 164
Fleas in relation to, 46, 161, 162, 163, 164, 522, 523, 524, 526, 529, 530, 533, 649
Human Flea as Vector, 163 *bis*, 526
of Rodents
Cochin China, 524
Dakar, 619, 620
Rat-flea Surveys in Ceylon, British and Dutch East Indies, 522, 523
South Africa, 566, 567–8
Species Long retaining Infection, 164, 566, 649 *&n.*
Tunisia, 524
Neocoptopsylla n. gen. of, 525
Revision of, 524
Grain Imports in relation to, 523, 530
Haffkine's Vaccine, 527
Incidence
Angola, 565
Ceylon, 522, 523
Colombo, 522
Protection from, of the Interior, 529
Chile, 162
China, 649
Cochin China, 524
Saigon, 524
Dutch East Indies
Java, 527
Epidemiology of, *Xenopsylla cheopis* in relation to, 164
House Shrew in relation to, 165 *bis*
Rat density as Factor in Epidemiology, 164
Macassar, 523

Plague—*cont.*
Incidence—*cont.*
Far East, 649
India
Bombay, 167
Table of Statistics of Epidemics, 168
Forecast of, for 1932 and 1933, 651
Spread of, Rat Fleas and, 522, 523
Kenya : Nairobi, 166
Madagascar : Tamatave, Hot-Weather Epidemic, 533
Manchuria, Epidemiological Study of, 169
Morocco, 163
Relative Importance in, of Rats, and Human Flea, 163, 526
Peru, Epidemiology of, 161
Poros, Isle of (Greece), Epidemic, 1837, 168
Senegal
Dakar, Epidemiology of, 525 *bis*
Flea Evacuation of, 46
Rufisque, Primary Pneumonic, 526
S. Louis, Epidemic (1929), 252
S.W. Africa, 565, 800
Ovamboland, 161
U.S.S.R., 163
Laboratory Work on, Peru, 161, 162
Neocoptopsylla n. g., Tunis, 525
Pasteurella pestis
Differentiation of, from *Past. pseudotuberculosis rodentium*, 637
Indian Strains, Virulence of, 416
Pasteurella of White Rat, 531
Pneumonic, Sudden Deaths in relation to, 526
Prophylaxis
Anti-plague Campaign, Peru, 161
Anti-Plague Serum and its Concentration, 637
Cyanide Fumigation of Suspect Imports, 529, 531
Dwelling-House Rat-Proofing, Java, 527
Moroccan, 526, 527
Vaccination Results, 167 *quat.*, *table* 168
in Java, 527
Vaccines
in Bombay, Testing, 637
Haffkine's, 527
at Lister Institute, Preparation, 166
at Nairobi, 166
Rat Plague, Diagnosis of, 532
Rats and other Rodents in relation to, 162 *bis*, 163, 164, 522, 523, 524, 528, 530, 531, 532, 565, 566, 567–8
Antofagasta, Fleas *per* Rat, 162
Ceylon, Rat Subspecies Identified, 522
Cochin China, Flea Index, 524
House Shrew in Java, 165, 523
Immunity, Comparative, of the Bombay Rat, 414, 528
Java, 164, 523
Length of life of Rat after Infection by Flea, 530
Macassar, 523
Nomenclature of species of *Mus* genus, 531
S. Africa, Rodents and their Ectoparasites, 567–8 *&n.*
Tunisia, 524
Ziesel Mouse, Latent and Chronic Form, 532
Temperature in relation to Transmission by *X. cheopis*, 530

Plague—*cont.*
Titles of Unnoticed Papers, 169, 533
Transmission by
Bedbugs, 163
Fleas, 162, 163
Treatment
Bacteriophage, 166, 531
Bayer 205, 166
Vectors, Change of, Possibility of, 529
Virus
Viability of, in
Bedbugs, 163
Fleas, in Suslik Nests, 164
Xenopsylla astia, in Ceylon, 530
in Dakar, 619, 620
brasiliensis, Dakar, 619
cheopis, 522
in Dakar, 619, 620
Distribution of, in Java, in relation to Epidemiology, 164–5
Infected, in Chinese houses, 649
Relationship of with Grain Storage of Imports, 522, 523
Transmission by, Temperature in relation to, 530

Pneumonia and other Pneumococcic Infections
Incidence
Belgian Congo, in Railway Natives, 645
Nairobi, in Africans : Mortality : Treatment, 645
Pneumococcus Infection in White Mice, Treatment with Quinine Weil, 38
Prophylaxis, Suggested, for Native Railway Workers : Belgian Congo, 645

PROTOZOOLOGY, *see* **MEDICAL ZOOLOGY**

RABIES, 133–43, 575–87
Animals Insusceptible to
Frogs, 584
Susceptible to
Genets, 576
Meerkats, 576
Milk of, Passage through, of Virus, 137, 587
Mongoose : India, 142, 585
Antibodies in, Site of Origin, 138
CANINE
Dog Immunization and, Fixed Virus for, 143
Ether Virus : Tunis, 142, 586
Haemorrhagic Gastro-enteritis in, 142
Ill-fed Animals and Liability to, 687
in Pup of Mad Bitch, 138
Complement Fixation in, Method for Estimating the Degree of, 580
Diagnosis, 137, 579
Encephalitozoon rabiei, 575
EQUINE, of Long Incubation, 142
EXPERIMENTAL, in
Alcoholised Animals in relation to Immunity 143
Hedgehogs, 136
Frogs Refractory to Infection of, 584
Glugea Lyssae, 575

Rabies—*cont.*
Immunity, in relation to Alcoholizing of Experimental Animals, 143
and Site of Origin of Antibodies, 138
Immunization of Dogs, Fixed Virus for, 143
Incidence in Animals and Man
Algiers, 141
Belgian Congo, 141
Egypt : Alexandria, 142
French Indo China, 39
India, 637
Calcutta, 141
Morocco, 137
Palestine : Jerusalem, 586
Rumania, 136, 576
South America, 133
Tunis, 38, 142, 585
U. S. Africa, 576
Animal Sources of Infection, 576
U.S.A.
Nevada : History of, 142
Philadelphia : Clinical Features, 579
South Carolina, 141
U.S.S.R.
Leningrad, 141
Odessa, 576
West Africa, 142
Incubation, Long, 142, 579
Mal de Caderas as Identical with, 133, 578
Fixed Virus Vaccine for Prophylaxis, 578
Mortality : Race-Percentages, 141, 582
Negri Bodies in
Nature of, 135 *bis*
Rôle of, in Diagnosis and Etiology, 579
Seat of Election for, 575, 576
Nucleus oculomotorius, the, a Seat of Election for Negri Bodies (*q. v.*), 575, 576
Paralysis of, Post-vaccinal, 139, 142, 584, 585, 586
Paralyssa (Trinidad form), 133, 586
" Parasite " of, Polycystic Structure, 575
Pasteur Institute Statistics, 38, 39, 138, 141, 142, 582 *sqq.*
Pathology, 135, 137–8, 579
Prophylaxis
at Alexandria, 142
Anti-rabic Vaccination, 143
Effect of, on the titre of Haemolysins in Rabbit Sera, 143
India : Statistics, 637
Immunization of, Animals : Tunis, 585
by Etherized and Carbolized Vaccines, Comparative Values of, Tests of, 581
by Fermi's and Philipps' Vaccines, Comparisons of, 582
Japanese " Antirabic week," 585–6
Vaccines for
Alivisatos, 581
Carbolized, 581
Hempt's, 581
Pseudo-
Virus of, Identity of, with that causing Mad Itch, 577, 578
Pathogenicity of, Modification of, 578
Route of, in the Organism, 578
Rabicidal Antibody Content of Rabbit Immune Serum, 139

Rabies—*cont.*
Rabies Vaccine Encephalomyelitis, 143
Review of Recent Articles, 133, 575
Serology, in, 580
Staining-Methods, 579
Statistics, 138, 581
Symptomatology, 137, 579
Treatment (*see also* Prophylaxis, *supra*), 138, 581
Antirabic Inoculation, 139
Statistics of, for India, 637
Anti-rabic Sera, 140
Results : Reports on, from Pasteur Institutes, 582
Chloroform in conjunction with Antirabic Sera, Suggested, 140–1
of Domestic Animals : Hungary, 585
Dried Cord Method, 139, 141
Encephalomyelitis after, 143
Fermi's Sero-vaccine, 139, 141 *bis*
General Remarks on, 584
Intravenous Injection Dosage : Diagnostic use, 137
at Pasteur Institute, 38, 39, 138, 141, 142
Second Review of, 138
Paralyses after, 139, 143, 586
Phenolized Dilutions, 141
Post-infectional, of Domestic Animals : Hungary, 585
for Postvaccinal Paralysis, 143
Protective power of, Comparison of, 139
Puntoni's Method and Anaphylactic Shock, 586
Semple's method, 583, 584
Paralysis after, 586
Sparteine, 140, 587
Theocin, before Rabicidal Serum, 140
Trinidad variety, 133, 586
Virus, 133, 575
Action on, of Dilution, 139
Antigenic Properties of, 580
Contradictory results when variously Inoculated, 579
Cystic Stage in White Mouse, 575
of Different Strains, Differences in Evolution Cycle of, 134
Etherized, Treatment by, of Dogs and other Animals, 586
Fixed
Change in Biological Properties of, 577
Considered as a Mutation of *Glugea lyssae*, 134
Dog, for Dog Immunization, 142
Existence of, in Rabbits' Brains after Antirabic Treatment, 138
Highly Virulent Rumanian Strain, 136, 576
Non-agglutinable Strains, 580
Transmission from Mother to Young, 581
Tunis Strain, 136
Used at Budapest, 577
Vipera aspis Venom as Protective against, 182
Identity of that of Brazzaville with European, 576
Introduction of, by Peritoneal route, 579
in Lachrymal Gland, 137
Moroccan, 137, 586
Morphology of, 134 *ter*, 575

Rabies—*cont.*
Virus—*cont.*
Nature of, 134 *bis*
Oulou-Fato Strain, Effect of Subpassage on, 136
Passage of, through Milk of Infected Animals, 137, 587
Persistence of, in Tortoise Brain, 141, 142, 587
Street
of Exalted Virulence, 136, 576
Fixed by passage from Dog to Dog, Efficacy of, in Dog Immunization, 143
Mutation of, into Fixed, 134, 136, 576, 577
Sokolan Strain, Coming to equilibrium as a Fixed Virus, 577
Transmission
Factors and Route of, 135
Through Placenta of Bitch, 138
viâ Pulp of Dog's Canine Tooth, 579
Trinidad Strain, Examination of, 133, 586

RAT-BITE FEVER, 19, 367–8, 724–5
Arsenic and Bismuth Resistance in, 367 *bis*
Diagnosis, *Spirillum minus* of Mouse and, 19
Febrile Spirillosis : Cochin-China, 725
Incidence : Canada, 724
Natural Spirochaetosis in Rats transmissible to Guineapigs, 368
Spirillum minus in
Dogs, Persistence of, 723
Mouse, in relation to Diagnosis, 19
Loss of Hair due to, 725
Rats : Toulon, 640
Spirochaeta sinense in Cochin China, 725
Title of Unnoticed Paper, 19
and Typhus in the Guineapig, 877

RELAPSING FEVER AND OTHER SPIROCHAETOSES, 10–14, 360–7, 721–3
Arsenic-resistance in Spanish-African form, 10
of Spirochaetes in Animal Experiments, 10
Bilious Typhoid fever ; Egypt, as form of, 362
Bone Marrow in, 34
Chemotherapy, Direct and Indirect Action in, 723
Congenital, 361
Experimental in
Mice, Action in, of Immune Sera, 365
Experiments in Treatment,
General, 362
With Arsenic Compounds, 363
With Oleo-Solganol, 363
Rat, Accra, 363
Incidence : All Forms
America, North, 721
Belgian Congo ; Katanga, 12
Canada : B.C., first record of, 721
China : Shanghai, 360
Gold Coast, Spleen Histology of, 362
North Africa ; Two Forms ; Differentiation of, 650
Panama, Tick-borne, 361
Sudan Epidemic, 360 *bis*
Tunis : Spanish-African form, 10, 721
Turkmenistan ; Tick-transmitted, 7.2

Relapsing Fever—*cont.*
Incidence : All Forms—*cont.*
U.S.A.
California, 361
Due to Contamination by Tamarack squirrel, 731
Lice- and Tick-borne, Differentiation of, 650
Manchurian Strain, Infection-Persistence in Mice Brains, 12 *bis*, 13
Prophylaxis for Endemic areas, 360
Rodents, wild, Spirochaetes in, 361
Spanish African, Chemotherapy of, 10
Virus of, 10
Grey Rats as Reservoirs of, 722
Other Spirochaetoses
Avian. Transmission of, to Pigeon and Rabbit : Persistence of, in Brains, 366
Bronchial, in Italy and Sicily, 14
Fowl Spirochaetosis, Henry's Serum-Flocculation in, 723
Spirochates = Spirilla = Treponema associated with,
Arsenic-Resistance of, in Animal Experiments, 10
duttoni, Persistence of, in Brains of Infected Mice, 364
var. *crocidurae*, Identity of, with a Spirochaete from Dakar, 14
Filtration of, through Graded Collodion Membrane, 723
in Guinea-pigs, 810
hispanica var. *marocana*, Long Persistence of, in Jackal, 365
Manchurian Strain in Mice Brains, Persistence of, 12 *bis*, 13
from Rat, Pathogenic to Man, 12
recurrentis, Cultivation of ; New Method, 366
Effect on, of Deposition of Chemotherapeutical Drugs, 11
in Tamarack Squirrels, 721
Transmission by Ticks, 11
in Wild Rodents, 361
Spleen in, Pathology of, 362
Strains of, at Dakar, Identity of, 14
Tick-spread, Mammalian Reservoirs of, Panama, 361
Titles of Unnoticed Papers, 14, 367
Transmission by
Lice, 360, 361
Ticks, 361, 722
Treatment
Antimony Compounds, 723
Chemotherapeutic ; of White Mice, 362, 363 *bis*
Grey Oil, 360
Rare Metals, 38
Stibosan H 471, for Animals and Man, 723

REVIEWS OF BOOKS AND NOTICES, 55–60, 131–2, 188–92, 262–4, 327–30, 409–10, 569–74, 656–8, 817–18
Allergy (Oriel, foreword by Barber), 60
Animal Diseases in South Africa (Henning), 656
Ankylostomose, L' (Garin, Rousset, & Gonthier), 262

Reviews, &c.—*cont.*
Atlas, An, of Skin Diseases in the Tropics (E. C. Smith), 188
Bacteriophage in the Treatment and Prevention of Cholera (Morison), 131–2
Bartonellen, Die, und verwandte Parasiten bei Mensch und Tieren (Kikuth), 572, 818
Chinin in der Algemeinpraxis unter Berücksichtigung pharmakologischer Befunde. Ein Nachtrag (Johannesshon), 264
Compendium, A, of the Pharmacopoeias and Formularies (Official and Unofficial) . . . (Thompson) 263–4
Conferencia Sanitaria Nacional de 1931 (Venezuela), 132
Cure, The, of Haemorrhoids, Varicose Veins and Ulceration, and Allied Conditions (McAusland), 817–18
Diagnostic et traitement du kala-azar méditerranéen (d'Oelsnitz), 573
Diptera. Fam. Culicidae (Edwards), 915
Empire Problem, An : the House and Village in the Tropics (Blacklock), 59–60
Estudos sobre o typho exanthematico de S. Paulo (Monteiro), 574
Fièvre boutonneuse. Fièvre exanthématique du littoral Méditerranéen (Olmer, D., & Olmer, J.), 409–10
Fonds Reine Elisabeth pour l'assistance médicale aux indigènes du Congo Belge (Foréami) Rapport annuél sur l'exercice 1931. (Royaume de Belgique), 569–70
General Haematology. With Special Reference to the Child in Health and Disease (Feldman), 657
History of Chinese Medicine (Wong & Wu L'ien-Teh), 191–2
Hookworm Infection (Lane), 55–6
Hygiène, L', des travailleurs noirs dans les camps industriels du Haut-Katanga (van Nitsen), 658
Indigenous Drugs of India. Their Medical and Economic Aspects (Chopra), 262–3
Intestinal Protozoa, and the Diseases caused by them. (Philiptschenko,) 572
Medical Entomology (Matheson), 327
Melioidosis (Stanton & Fletcher), 327–8
Memoria de la Compaña contra el paludismo (1930–1931) (Comisión Central de Trabajos Antipaludicos), 573–4
Non-Tropical Sprue, A Study in Idiopathic Steatorrhoea (Thaysen), 57–9
Onderzoekingen over urobilinurie als leverfunctie-proef (Meijers), 657
Paludisme dans les Deltas. Delta de l'Ebre (Pittaluga et al.). Delta du Danube (Zotta), (League of Nations), 264
Reviews, &c.—*cont.*
Parasitic Worms of Man. An Introduction to Medical Helminthology (Kranzfeld), 572
Pathogenic Protozoa, Spirochaetes and Fungi, Principles of General and Medical Protistology (Epstein) 915–16
Programme des cours de malariologie institués par l'organisation d'hygiène de la Société des Nations, 410
Rapporto sul funzionamento dell' Instituto di Patologia Coloniale, 1931–1932 (Regia Università di Modena), 657–8
Rockefeller Foundation. Annual Report 1931, 329–30
Sixth Venereal Disease, A. Climatic Bubo, Lymphogranuloma Inguinale. (Stannus), 817
Spezifische Arzneifestigkeit, Die, der pathogenen Mikroorganismen (Schnitzer), 328–9
Standard Classified Nomenclature of Disease, A (Logie, ed. by), 329
System, A, of Surgery, 3rd ed. (Choyce & Beattie, edited by), 189–91
Tenth Conference of Medical Research Workers . . . Calcutta, 5–10 Dec., 1932, 570–1
Third Pandemic, The, of Plague in Egypt. Historical, Statistical and Epidemiological (Wakil), 56–7
Treatise, A, on Materia Medica and Therapeutics (Ghosh), 818
Tropenkrankheiten (Ruge), 574
Zoonosen der Haut in wärmeren Ländern (Martini), 571

Rocky Mountain Spotted Fever, *see under* **TYPHUS AND UNCLASSED FEVERS.**

SLEEPING SICKNESS AND TRYPANOSOMIASIS, 104–24, 430–57, 765–97
Baboons, Experimental Infection of, 117, 456
Bacterial Products having Trypanocidal Powers, 446
Blood in Experimental, Lactic Acid Content and Alkali Reserve of, 120
Chancre, So-called Trypanosomal, Race Incidence of, 432
CHEMOTHERAPY, *see also* Treatment *infra*
Antimonial Derivatives of Quinoline, New, Therapeutic Action of, 445, 788
Arsenobenzols in use in Belgium, Comparative Trypanocidal action of, 116
Bayer 205, and Antimonial Combined, 785 *bis*
Infectivity of Blood of *T. congolense* Infected Mice after, 790
with Other Drugs, 114 *bis*
Synergic Action of, Mechanism of, 445
Trypanocidal Action of, Mechanism of, 784

Sleeping Sickness and Trypanosomiasis—*cont.*
CHEMOTHERAPY—*cont.*
Bismuth Salt, Action of, on, 789
Chemoflexion, 793
Chemotherapeutic Agents, Action of, on, 124
Cytological Investigations, 792
Significance of the Host, 790, *table* 791
Drug Resistance, 112 *sqq.*, 447 *bis*
Picric Acid and Arsenolbenzol, Combined, Action of, on Infected Mice, 446 *&nn.*
Rare Metals in Nagana in Mice, 38
Rongalitweiss Reaction, 792
Sodium Thiosulphate and Arsenic Resistance, 447, 448
Trypanocidal Drugs, New, 797 *bis*
Trypanocidal Effects of Different Substances 446
of *T. congolense* Infections, 789
Tryparsamide
Brands of, Toxicity Tests, 786
Conservation of, in the Tropics, 116
Horse Serum as an Excipient of, 124
Serum and Distilled Water as Excipient of, 788
and Tséamine, Comparative Value of, 788
Tryparsamide Resistance, 431
Transmissibility by Glossina, 448 *bis*
Tryponarsyl Resistance, Transmissibility of to Man, 776
Conservation of, in the Tropics, 116
Fowl of Uganda as Host for *brucei* group, 454
GLOSSINA = Tsetse-flies
Control of
Biological, 314
Clearings and, 311, 312, 313
Fly-traps for, 104, 177, 617, 618, 619
Gold Coast, 312, 313
Measures for, 437, 438, 616
Nyasaland, 177
Ecological Study of, 311
of Gabun, 617
Game in relation to, 617
haningtoni: Habitat, 617
Infection Rate of, and Temperature, 453
longipalpis, Infection by, of Guineapig, with *T. congolense* and *T. gambiense*, 117
morsitans
Atmospheric humidity and, 617
Ecology of, 616
and *G. palpalis*, comparison of, as Vectors of Trypanosomes, 438, 439
and *G. tachinoides*, Pupal Parasitism in: Nigeria, 313
Mutilla glossinae Parasitic to, 314
Trapping of, 177, 618
palpalis
on Cattle route, Gold Coast, 312, 313, 619
Cyclical Transmission by, of Resistant Strains of *T. gambiense*, 773, *table*, 775.
Head, Mouth-Parts and Salivary Glands of, Revision of, 314
Light-loving, 618
Trapping Experiments, 104, 618, 619
pallidipes
Large Trap-captures of, Zululand, etc., 177, 618

Sleeping Sickness—*cont.*
GLOSSINA = Tsetse-Flies—*cont.*
pallidipes—*cont.*
Trypanosome Infections of, in Zululand, 457
Pupal Parasites in, 314
Reports on, 1925–31, 436 *sq.*
Nigeria (1931), 431
Sexes of, Relative Susceptibility of, to Trypanosome Infection, 770
swynnertoni, 617
Trapping of, 618
tabaniformis: Habitat, 617
Light-loving, 618
tachinoides
on Cattle Route, Gold Coast, 312, 313
Cyclical Transmission by, Influence of, on Resistant Strain of *T. brucei*, 451
Development in, of W. African Strains of *T. gambiense*, Temperature and, 105
T. gambiense Strains Transmissible by, 431
of Tanganyika Territory, 616
Transmissibility to Man of Trypanosomes of Damba Island, 104, 452
Transmissibility of Tryparsamide-fast Trypanosome, 448 *bis sqq.*, (*table*), 449
Transmission by, of Polymorphic Trypanosomes, Factors Influencing, 438, 439, 452
Immunity Processes in *T. lewisi* Infections of Rats, 121–2
Serum, Sera
Horse, as Excipient of Tryparsamide, 124, 788
Human, Action of, on *T. rhodesiense*, 765 *sq.*
Action of, *in vitro* on *T. brucei* and *T. rhodesiense*, 439
Combination of, with Dyes as increasing Trypanocidal Power thereof, 446
Resistant Strain of *T. brucei*, Influence on, of Fly Passage, 451
Immune, Action of Ultra-filtration and of Heat on, 119
Serum Proteids and Henry's Reaction in Experimental, 452
Titles of Unnoticed Papers, 124
Transmission, *see under* Glossina *supra*
Triatoma megista, Morphology of *T. cruzi* found in Dejecta, 123
Trypanocidal Liver Function, in Uterine Carcinoma and Gestation, 119–20
and Reproduction-inhibiting Antibodies to *T. lewisi*, 122
Trypanolytic Power of Immune Serum, Action on, of Ultra-filtration and Heat, 119
Trypanosome Strains, Gadau, Ayu and London, Tests of, 431
TRYPANOSOMES
Action on, of Chemotherapeutic Agents, Mechanism of, 124

Sleeping Sickness and Trypanosomiasis—*cont.*
TRYPANOSOMES—*cont.*
brucei
in Cattle, Gold Coast, 312
Experimental in Rats, Development of Lymphocytes and Plasma cells in, 455
Strain, Resistant, Influence on, of Cyclical Transmission by *G. tachinoides*, 431
brucei group, Domestic Fowl of Uganda as Host for, 454
brucei and *rhodesiense*, Action on, *in vitro*, of Human Serum, 439
Carriers of, other than Glossina, 177
Classification of, 778
congolense
in cattle, Gold Coast, 312
Infections, Chemotherapy of, 789, 790
in Rodents, Synergic Action on, of Bayer 205 and Aniline Antimony Tartrate, 114, 115
and *T. gambiense* Infection in Guineapig, from Bite of *G. longipalpis*, 117
cruzi
from Brazilian Bat, 797
in Dejecta of *Triatoma megista*, Morphology of, 123
Natural Immunity to, of Cold-Blooded Animals, 796
Pathogenicity of, for *Macacus rhesus*, 796
Transmission Experiments, 123
Transmitted from *Triatoma protracta* to Californian Mammals, 457
Drug-resistance of, 111, 447 *bis*
Mechanism of, 124
duttoni Infection in Splenectomized Mice, 730
gambiense
Behaviour of, in Culture, 118
development of W. African Strains of, in *G. tachinoides*, 105–6
Resistant Strains of, Cyclical Transmission of, by *G. palpalis*, 773, *table*, 775
Strains of, Transmissible by *G. tachinoides*, 431
hippicum, Experiments in Transmission of, with Vampire Bat, 120–1
Human, Arsenic-resistant, 770, 776
Infection with, and Spirochaetes in Guineapig, 810
Infection Rate of, in Glossina (Correspondence), 453, 797
lewisi
in *Dermanyssus muris*, 640
Infection of, in Child, F.M.S., 440
Infection, Oral, of Rats, 731
Immunity Processes in, 121
Trypanocidal and Reproduction Inhibiting Antibodies to, 122
of Mammals and Man, Classification of, 778
marocanum var. *cameli*, Immune Sera, Trypanolytic Power of, 119
Metacyclic, Vitality and Resistance of, 452
Pathogenic to Man, Action on, of Human Sera, 768

Sleeping Sickness and Trypanosomiasis—*cont.*
TRYPANOSOMES—*cont.*
Polymorphic, of Damba Island, Ability of, to Infect Man, 104
Developing in Gut of Glossina, Relation of, to Peritrophic Membrane, 794
Transmissibility by *G. palpalis*, 438, 452
Polymorphism of Some Considered Monomorphic, 793
rabinowitchi of Hamsters, experimental Studies of, 731 *sex*
Metacyclic forms, Vitality and Resistance of, 452
rhodesiense
Action on, of Human Serum *in vitro*, 765, 767
Atoxyl-resistant strain, Transference to Different Vertebrate Host, 111 *sqq.*
somalense of Toads, Cultivation of, 730
Spontaneous Disappearance of from three Europeans, 436
Transmission by Carriers other than Glossina, 177
TRYPANOSOMIASES
ANIMAL
Equine, Murrina of, Vampire Bats as Vectors: Panama, 120–1
and Human: Prophylaxis, 619
Treatment of, Developments in, 436, 437
EXPERIMENTAL
in Baboons, Naturally Immune, Intrathecally Induced, 117, 456
in Rats
Development in, of Lymphocytes and Plasma Cells, 455
Question of Transmission to Suckling, 457
HUMAN, due to *T. lewisi* in Child, Malaya, 440
HUMAN, AFRICAN
Advanced Stage, Treated by Intracarotid Injections, 783
Arsenic Resistant, Cured by Fouadin, 777
Carbohydrate Metabolism in, 442
Clinical Syndromes in, 110
Diagnosis
Differential, of West African from East African, 433
Lumbar Puncture in, 782
Fine Needles for, 782
Negro Tolerance to, 782
Red Cell Adhesion Test and, 453, 454
Drug Resistance with special reference to, 112
Eye Symptoms in, 444, see also **OPHTHALMOLOGY, TROPICAL**
Incidence
Cameroons
in Five-Days Old Baby, 781
Infection and Re-infection in, 106
Congo, Belgian
Katanga, Bibanga Mission, Review of 9,000 Cases, 434
Kwango District, 31
Leopoldville, 107
Thysville, 777
Tobi-Lushiko Sector, 776

Sleeping Sickness and Trypanosomiasis—*cont.*
TRYPANOSOMIASES—*cont.*
HUMAN, AFRICAN—*cont.*
Incidence—*cont.*
Congo, French, in Europeans, 436, 779
Fernando Po, 110
French Equatorial Africa, 778
Ivory Coast, 107
Nigeria, 431, 432
Northern, Causes of Spread, 430
Southern, 440
Portuguese East Africa, 800
Tanganyika Territory, 108, 765, 767
Togoland,
Prophylaxis, 104
with Orsanine, 110
Uganda, 442
Reports, for 1931, 104, for 1932, 433
Lymphocyte Count of the C.S.F. in, effect on, of Tryparsamide, 442
Meningeal Reactions in, Following Treatment, 443
Menstruation Arrested in, 781
Prophylaxis
Bayer 205 useful in, 110, 438
Control of Glossina, 437, 438
French Measures, 430–1
in Togo, 104
Orsanine in, 110
Red Cell Adhesion Test in, 453, 454
Reinfection with, 779
Rhodesian
Prognosis, 779
Signs of, in order of Frequency, 780
Serum
Trypanocidal Substances in
in Gestation, 119
in Uterine Carcinoma, 119
Sexual Impotence in, 781
Syphilitic Infection, Old, as Influencing Treatment, 444
Treatment, *see also* CHEMOTHERAPY, *supra*
Atoxyl: Optic Atrophy after, 442
Bayer 205, 108, 109, 437
and Tryparsamide, 108, 109, 441, 779
at Brazzaville Pasteur Institute, 778
Conclusions on, in Fernando Po and Spanish Mainland, 110
Developments in, 437 *bis*
in Early Stages, 110
for Europeans, 110
Germanin, *see* Bayer 205, *supra*
Influence on, of Old Syphilitic Infection, 444
Meningeal Reactions after, 443
Moranyl, *see* Bayer 205, *supra*
Orsanin, 110
Trypanocidal action of Human Sera, 765, 767, 768
Tryparsamide (Tryponarsyl)
Accidents with, 787
Effect of, on the Lymphocyte Count of the C.S.F. in, 442
Insufficient, Unfavourable Influence of, on Subsequent Treatment, 107
in Meningitic Cases, 107, 110
Question of Second course of, 435

Sleeping Sickness and Trypanosomiasis—*cont.*
TRYPANOSOMIASIS—*cont.*
HUMAN, AFRICAN—*cont.*
Treatment—*cont.*
Tryparsamide (Tryponarsyl)—*cont.*
Rare Eye Symptoms after, 441–2
Relapse Cases treated with Fourneau 270, 779
Results, Ayu Dist., Nigeria (*table*), 432
HUMAN, AMERICAN, or CHAGAS' DISEASE
Cardiac Form, 795
Experimental, Lung Changes in, 796
in Mammals, U.S.A., 794
Thyroid Gland in, Morbid Histology of, 795
Triatomidae proven Carriers of, 315
Recent Knowledge of, 797
Tsetse Fly, *see also* Glossina, *supra*
Report of Investigation, Nigeria (1931), 431
Report of Testse Fly Committee (1925–31) 436

Smallpox
Incidence
India
Forecast of, for 1932 and 1933: Result of the former, 651
Prophylaxis
Vaccination, Malay mode of rendering useless, 639

Soduku, *see* **RAT-BITE FEVER**

SPRUE, 245–7
Blood conditions in, 256, 258
Bone Marrow in, 34
Diagnosis, Differential, from Pernicious Anaemia, 245
Duodenal Involvement and Tetany in, 245
Etiological Theories, 246
Gastric Acidity in, 246
Incidence
Dutch East India, 247
Java, in Europeans, 812
Non-Tropical, Affections for which Misdiagnosed, 246
Incidence
Denmark, 246
U.S.A., 245
Title of Unnoticed Paper, 247
Treatment by Liver Extract, Parenteral: Rapid Benefits from, 246

Tsutsugamushi Fever *see under* **TYPHUS AND UNCLASSED FEVERS.**

Tuberculosis
Incidence
America, Tropical, 30
Argentina, 253
India and elsewhere, in British Forces, 633
Nauru Island, 628
New Hebrides, 251
Papua, 252
Rodrigues, 629
Senegal, St. Louls, 252
Southern Rhodesia, 799, 800
and Malaria, relations between, 648

TYPHUS AND UNCLASSED FEVERS (Critical Review, 343–9, *table* 406), 390–405, 872–914
Rift Valley Fever, Cytological Changes in Liver in, 913
Infectivity of, for Monkeys, 912
Titles of Unnoticed Papers, 913–14
TYPHUS AND TYPHUS-LIKE DISEASES
Agglutinins, Main and Group in, *tables* 406, 885
BOUTONNEUSE, FIÈVRE : Escharanodular or Eruptive Fever
Experimental Infection
in Dog, 906
Guineapig, 904, 905, 906, 907
Scrotal Reaction in, 402, 889
Horse, 907
Monkey, 904, 907
Rabbit, 907
Ocular Reaction, 888
Spermophile, 904
Squirrel, 906
White Mice, 904
Incidence
France, Toulon, Maritime Quarters, 904
Rumania, Constantza, *illust*, 902
Rhipicephalus sanguineus, Infection produced by Emulsions of, 402, 904, 905, 906
Intraocular Inoculation, 905
Rocky Mountain Fever, Relation of, to, 895 *bis*
Virus of
Dog as Reservoir, 906
Intradermal Reaction to, 907
Hereditary Transmission in *R. sanguineus*, 904
Longevity in Ticks, 905
Classification of, 391
by Vectors, 874
Common Origin of, 390, 872
Critical Review of, 343–9, *table* 406
Crossed Immunity Tests, 396, 878, 893, 894
ENDEMIC TYPHUS OR BRILL'S DISEASE
Benign, Rat as Test Animal for, 397
Experimental Infection
in Dog, 891
in Guineapig, 839, 890
in Monkey, 883
in Spermophile, 404
in White Mice, 883
Experimental Transmission by Various Insects, 888
by *X. astia*, 890
by *X. cheopis*, 403, 883
Incidence
Australia, Melbourne and Sydney, 879
Egypt, Alexandria, 403
France, Brest, 880
on French cruisers, 395, 877, 880
Japan (" Manchurian Fever "), 878
South Africa : Cape Town 396
U.S.A., 875, 876, 896
Rickettsia-like Organism from, Culture of, 908
and Rocky Mountain Fever, Differential Diagnosis, 397, 894, 895, 900
Spermophile, Susceptibility to, 404

Typhus and Unclassed Fevers—*cont.*
TYPHUS AND TYPHUS-LIKE DISEASES—*cont.*
ENDEMIC TYPHUS, &c.—*cont.*
Symptomatology of, 874, 900
Rash of, 875, 900
Vaccine prepared from Infected Fleas, 405
Weigl's Preparation of, 405
Virus in Brains of Rats of
Alexandria, 403
Antwerp, 889, 890
Bordeaux, 403
Casablanca, 890
Lyons, 403
Toulon, 889
Wild Rats, U.S.A., 878
Maintenance in Rats and Mice, 882, 883
EPIDEMIC TYPHUS
Differentiation from other Forms, 390, 649, 650, 872
Experimental Infection
in Dog, 891
in Rabbits, Ocular Reactions, 888
in Spermophile, 891
in Squirrels, 890
Incidence
China, North, 878
French Indo-China since 1908, 876
Spermophile, Susceptibility to, 891
Virus, Action in Louse, 381
Action in Rats, 391, 873
Cultivation, Notes on, 887
Maintenance in guineapigs, 882
by Pleural Passage, 881
in Rats, 881, 882
Weigl's Vaccine, 405
Experimental Typhus in Guineapig, Infections simulating, 404
Henry's Reaction in, 892 *bis*
Historic Typhus, *see* Epidemic Typhus *supra*
Immunity Studies, 887 *ter*. *see also* Crossed Immunity Tests, *supra*
Horse Immunized with Rickettsia, Properties of Serum, 887
Kenya Typhus, 395, 910
" Manchurian Fever " in Japan, 878 *see* ENDEMIC TYPHUS *supra*
Mite Fever *see* Tsutsugamushi Diseases *infra*
Murine, Diagnosis of, in reference to Sodoku, 877, *see also* Rat, *infra*
in Man, at Toulon, 877
Natural History of, 390, 874
Nomenclature, 872, 873 *ter*, 874
Proteus, Types of, 884
Rat
and Human Strains, Crossed Immunity to, of Guineapigs, 396, 878
and Rat-Bite Fever (*q.v.*) in Guineapigs, 877
Rickettsia in Guineapigs Infected with the S. Paulo Type, 402
Culture experiments, 908
Killed, Vaccine of, for Immunization, 887 *bis*
of Mexican and European, Serum Reactions, 400
Rickettsia-like Organism in Tunica of Rats and Guineapigs, 880

Typhus and Unclassed Fevers—*cont.*
TYPHUS AND TYPHUS-LIKE DISEASES—*cont.*
Rickettsial Fever, Sporadic Benign, with Exanthem, 875
Rocky Mountain Spotted Fever *see also* Sao Paulo
Crossed Immunity Tests, 893, 894
Diagnosis, Differential, 397, 894, 895, 900
Distinct from fièvre boutonneuse, 895 *bis*
Eastern Type, 397 *bis*
Histology of, 900
U.S.A.: Southern States, 900, 901
Virus of, Recovered from Dog Tick, 895
Experimental Infection
in Dog, 891, 896
in Guineapigs, 397
in Rabbit, Ocular Reaction, 888
in Sheep, 898
Incidence
U.S.A., 896
in Children, 908
Southern States, 900
Western States, 902
Prevention of, 901
Summary of Present Information on, 897
Vectors, Vicarious, 899
Virus of, Dogs and Sheep, Susceptible to, 896
Recovered from Dog Tick, 895
Sexual Transmission in Dog Tick, 898
Tick Transmission of, 897, 898, 899
Sao Paulo Typhus, 391, *see also* Rocky Mountain Spotted Fever *supra*
Convalescent Sera of, and of R.M.F., Protective Powers, 893, 894
Proteus XL and, 401
Rickettsia in Guineapigs Infected with, 402
Tick Transmission of, 893 *bis*
Virus in Rats, 892
Scrotal Reaction in, of Guineapigs, 397, 402 889
" Scrub " Malaya, 910 *see* Tropical Typhus
Serological Types of, 406, 884, *table* 885
Serotherapy by Meningeal Route, 400
Serum Reactions of Rickettsia, 400, 401, 887
Southern Rhodesia, Fever of Typhus Group in, 396, 800
Sumatran Mite Fever *see* Tsutsugamushi Disease *infra*
Summary of Knowledge of, 874 *bis*
Symptomatology of Typhus-Spotted Fever Group in relation to Vectors, 874
Tick Bite Fever
in Children, U.S.A., 908
South African, in G.P.I. Therapy, 909
" Tick " Typhus, Kenya, 395, 910
Delhi (?), 399
Southern Rhodesia (?), 396, 800
Tropical Typhus
Bacteria from, Study of, 910
Incidence
India
Bangalore, 398
Burma, Rangoon, 399, 910
Delhi, due to tick?, 399 *bis*
Hyderabad, Sind, 910
Kenya, Tick Typhus, 395, 910

Typhus and Unclassed Fevers—*cont.*
TYPHUS AND TYPHUS-LIKE DISEASES—*cont.*
Tropical Typhus—*cont.*
Incidence—*cont.*
Malaya, 637
Union of South Africa; Cape Town, 396
Proteus X Agglutination with, 401
Resumé of Present Knowledge, 399
" Scrub " in White Mice, 911
Vector in Kenya, 910
Tsutsugamushi Disease, Kedani, Japanese River Fever, Mite Fever, *see also* Tropical Typhus
Incidence
Cochin China, 400
Sumatra, 393, 394, 912
Proteus X Agglutination with, 401
Rickettsia in, P.M. Proliferation of, 911
Sumatran Mite Fever
in Guineapigs, 912
in Monkeys, 394
in Rabbits, 394
Tunica Vaginalis of Guineapigs and Rats, Rickettsia-like Organism in, 880
Typhus-Spotted Fever Group, Summary of Knowledge, 874 *bis*, 896
Vaccines
Immunization against Tunisian Typhus with Mexican Typhus Vaccine, 887
Weigl's Vaccination Method, 405
Virus(es) of
in Brains of Rats, Guineapigs and Mice, Conservation of, 882 *bis*, 883
Cultivation of, 887
Forms of, Unity or Plurality of, 872, 873
Immunizing Power of Associated Typhus Viruses, 881
Maintenance of Epidemic, by Rat and Guineapig Passage, 881
Old and New World, Different Reactions of, 390
Passage through Digestive Tract, 880, 883
Precautions in Research, 398
Serological Types of, and Corresponding Types of *Proteus*, 884, *Table* 885

Unclassed Fevers, *see* **TYPHUS AND UNCLASSED FEVERS**

Undulant Fever
Bone Marrow in, 34
Incidence
Argentina, 253
Southern Rhodesia, 800
Treatment
Melitin, Formolized, 49
Protein Shock Therapy, 809 *bis*

Weil's Disease, *see* SPIROCHAETOSIS ICTERO-HAEMORRHAGICA *under* **LEPTOSPIROSIS**

YAWS AND SYPHILIS, 185–7, 595–7 (Critical Review, 739–51)
GANGOSA, in Liberia, N.E., 636
JUXTA-ARTICULAR NODULES
Etiology, 187
in Malagasies, 597
Nomenclature, 597
and Rheumatic Nodes, 597
SYPHILIS
Incidence
Belgian Congo, in Natives, 635
YAWS
Bone Lesions, Tertiary, in Radiology, 596
Crab Yaws, 635, 636
Cerebrospinal Fluids in Philippine Monkeys Inoculated with, and Syphilis, Serologic Study of, 596
Heredity in, 596
Incidence
Belgian Congo, 187, 635
Brazil, 186
Costa Rica, 186
French Indo-China : Saigon, 596
Liberia, N. E., 635, 636
New Hebrides, 251
Nicobar Islands, 595
Ruanda-Urundi, 596
Southern Rhodesia, 800
U.S. Africa, in a Rand Mine, 595
Surinfection in, 185, 186
Treatment
Gold (Solganal B.), 186
Mass, with Neoarsphenamine or Sulpharsphenamine, 248
Neosalvarsan and Rhodarsan, 186
Stovarsol, 251
YAWS AND SYPHILIS
Diagnosis, Differential, Criteria for, 185, 597
Titles of Unnoticed Papers, 187
Unitarian view on, of Käyser, 642
Unity or otherwise of (Critical Review), 739–51

YELLOW FEVER, 1–9 (Critical Reviews, 265–77, 278–90) ; 350–9, 623–6, 714–20
Aëdes aegypti (*argenteus*), Biology of, 294, 350
Breeding places of : Samoa, 294
and *Chara fragilis*, 298
Control Measures in Africa, 565
in Kutais, Georgia, 307
Larvae, Effect on, of Salt Waters, 295, 296
Longevity experiments, 351
in relation to Humidity, 610
Negative Thermotaxis in, 610
Nomenclature, 614
Transmission of, by Aircraft, etc., 563, 564, 565
Virus in
Incubation period of, Temperature effects on, 5
Transfer of, from Female to Male, 5
Transmission Experiments with, *via* South American Bats, 6
Albuminuria in Diagnosis and Prognosis of, 4
Antibodies of, Absent from Blood of Recovered Dengue Patients, 8
Antigen for Complement Fixation Reaction in, Keeping Qualities of, 7

Yellow Fever—*cont.*
Bats, South American, Transmission Experiments with, 6
Bedbugs as Transmitters of, 5
Bromosulphalein Liver Function Test in, 355
Complement and Fibrinogen in Chloroform Intoxication and, 356
Complement Fixation Tests, 3, 4
Antigen for, Keeping Qualities of, 7
Culex thalassius a possible Vector, 351
Culicine potential Carriers of : Sierra Leone, 301
Control Tests with *Macacus rhesus*, on Protective Value of the Serum of, 6 *bis*
and Dengue, Possible Immunological relations between, 353
Diagnosis, Serological and Immunity Tests, 2, 3, 4
Diounde, a Disease resembling, French Sudan, 719
Endemic and Epidemic, 352
Epidemiology (*see also* Incidence, *infra*), 1
Immunity Tests in, 2, 3 *bis*, 4
Experimental, in *Macacus rhesus*, Chemistry and Metabolism, 8, 356
Modern Knowledge of, 9
Experimental Studies on, 715
Icterus Index in, 357
Immune Sera (Serum), Preservation of, 714
Protective Antibodies in Intracerebral Test in Mice for Ascertaining Quantitatively the Amount of, 714
Immunity of Inhabitants of Endemic Areas, 4
Immunization, *see under* Prophylaxis, *infra*
Incidence
Angola, no cases since 1899, 565
Bolivia, 278, 719
Endemic foci, 351
Brazil
Immunity Tests in, 3
Recrudescence, 2
Colombia : Recrudescence, 2
Fernando Po, 717 *bis*
French West Africa, in Europeans, 720
Mediterranean area, Problem of, 353
Nigeria, 1 *bis*
Portugal, Lisbon, Epidemic of 1857, 4
St. Pierre, Martinique, Epidemic, 1880–1, 4
Sierra Leone, 1
Present, but not reported since 1910, 1
West Africa
British
Epidemiological and Entomological Studies in, 350
Seasonal Variations, 350
Epidemiology since 1931, 1
French, in Adults and Children, 3
Endemic Foci, 350
Measures for Prevention and Control of Epidemic in, 623 *&nn.*
Places affected, 2, 350
Results of the Y. F. Mission to, 3
Rockefeller Commission's Work in, 1
Intracerebral Injection of Immune Serum as Protection Test in Mice, 714
Intranuclear Inclusions in, Microincineration of, 718
Leucocyte Formula, 357

Yellow Fever—*cont.*
Liver Fat of Monkeys dead of, 9
Mansonia africana, possible Vectors of, 351
uniformis, Transmission Experiments with, 4
Monkey-Protection Tests, 3
Mouse Strain, verification of, 8
Mouse Virus
Attenuation and Preservation of, 715
Neurotropic, Neutralization of, by Horse Yellow Fever Antiserum, 716
Transmission of, by Mosquitoes, 355 *bis*
Prophylactic Use of, 359, 564, 716
Reactions in Man after Inoculation with, 715
Pathology, 1
Phosphorous Poisoning and, Analogous Features in, 9
Prophylaxis
Anti-Stegomyia Campaign, Dakar, 719
in Argentina, 719
Inoculation (Vaccination),
by Aragão's Method, 357
with Horse Antiserum, 716
with Living Virus, 716, 717
with Mouse Virus, 1, 359, 564
without Immune Serum, 716
Sawyer, Kitchen, and Lloyd's Method, 717
with Virus mixed with Serum, 6 *bis*, 8
Measures for the Prevention and Control of Y.F. Epidemics in French West Africa, 623 *&nn.*
Principles of the Internat. Sanitary Convention for Aerial Navigation, adoption of, 563, 564, 565
Protection Test in Mice by Intracerebral Injection, 714
Protection Test Surveys in Africa, 564
Recent Advances in Knowledge of, 1
Recent Knowledge concerning (Critical Review), 265–77
Recent Literature on, 358
Risk of, in Spanish Guinea, 717 *bis*
Rockefeller Foundation's Yellow Fever work, 563, 564
in West Africa, 1
Rodents, Wild, Susceptibility of, to Virus of, 353

Yellow Fever—*cont.*
Serum Chemistry in Experimental, in *Macacus rhesus*, 8
Some Recent Advances (Critical Review), 278–90
Titles of Unnoticed Papers, 9, 359, 720
Transmission of, and Modern Means of Communication, 352, 358, 563, 564, 565
by Mosquitoes other than *Aëdes aegypti* (*q.v. supra*), 279, *table*, 280–1
Experiments with
Aëdes aegypti, and South American Bats, 6
Aëdes and *Culex*, 353
Bedbugs, 5
Brazilian Mosquitoes, 5
Culex thalassius and *Mansonia uniformis*, 4
Macacus rhesus
Chemistry and Metabolism in, 8, 356
Infectivity of the Animal after, 356
with Mouse Virus, 354
Pathogeny in, 354
Serum Chemistry in, 8
Mosquitoes, 353, 355 *bis*
Triatoma megista, 353
Urine in, Examination of, Old Records of, 4
Virus, *see also* Mouse Virus, *supra*
Human and Mouse, 6 *bis*
Incubation Period of, in *Aëdes aegypti*. Effect on, of Temperature, 5
Neurotropic
Effects of Inoculation with, on *Macacus rhesus*, 354, 356
Encephalitis due to, in S. American Apes, 718
Guinea-pig Susceptibility to, 718
Pathogenesis of, in *Macacus rhesus*, 354 *bis*
Transfer of, from Female *Aëdes aegypti* to Male, 5
Susceptibility to, of some Wild Rodents, 353
in Tissue Culture, 8, 357
Transmission of, *see* Transmission Experiments, *supra*
used for Vaccination, 715, 716 *ter*, 717

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
by the South Essex Recorders, Ltd., High Road, Ilford.

(892) Wt. P2645/119 1875 5/34 S.E.R. Ltd Gp. 353.